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SOME NEW OR RARE FLORIDA DISCOMYCETES AND HYSTERIALES

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(WITH 6 FIGURES)

Extensive collections of fungi made in Florida during the years 1937 to 1943 by Dr. C. L. Shear include about three hundred specimens of Discomycetes and Hysteriales which the writer has had the opportunity of examining. Several of these appear to be undescribed and are named as new in this account; notes are also given on four other species which are unreported or rare in the United States. The specimens have been deposited in the Mycological Collections of the Bureau of Plant Industry, and where the material was in sufficient quantity to divide, portions have been also sent to the herbaria of the New York Botanical Garden, the University of Michigan, and to the Farlow Herbarium of Harvard University.

The writer gratefully acknowledges the receipt of type specimens from Drs. David H. Linder and W. L. White of the Farlow Herbarium and Dr. H. M. Fitzpatrick of Cornell University. References to some of the fungi here discussed were also supplied through the kindness of Dr. White.

1. **Lophium Tillandsiae** sp. nov.

Ascomata superficial, sparse, flabelliform, laterally compressed and narrowed toward the base, fuscous to fuscous black,[1] slightly

[1] Color nomenclature throughout is that of Ridgway, R., Color standards and color nomenclature. Washington, 1912.

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paler above, 0.3–0.5 mm. high, 0.2–0.3 mm. wide, 0.1 mm. thick, opening by a slit along the top, minutely roughened and sometimes faintly transversely striate; asci terete, the wall thickened at the apex, short-pedicellate, 8-spored, 250–300 × 10–12 μ; ascospores nearly the length of the ascus, 2.5–3 μ thick, hyaline or subhyaline, parallel, multiseptate, spore sections oblong, 1-guttulate, 4–5 μ long; paraphyses filiform, irregularly branched, pale brownish.

Ascomata superficialia, sparsa, flabelliformia, lateraliter compressa et basim versus attenuata, nigro-fusca, 0.3–0.5 mm. alta, 0.2–0.3 mm. lata, 0.1 mm. crassa, rima apicali aperientia, minute asperula, interdum transverse striata; asci teretes, apice crasse tunicati, breve stipitati, octospori, 250–300 μ longi, 10–12 μ lati; ascosporae longitudinem asci subaequantes, 2.5–3 μ crassae, hyalinae vel subhyalinae, multiseptatae, paralleles, articulis oblongis, uniguttulatis, 4–5 μ longis; paraphyses filiformes, irregulariter ramosae, pallide fuscidulae.

On *Tillandsia fasciculata*, Mar. 3–4, 1941, C. L. Shear *1386* and *1387* and on *Tillandsia* sp., Mar. 1, 1937, *725* (*Type*), all from Highlands Hammock, near Sebring.

L. Tillandsiae differs in shape from other species of *Lophium* having apothecia less than 1 mm. in height, also from *L. schizosporum* Maire in the absence of a black subiculum, and in shorter asci.

Few fungi have been found reported on *Tillandsia;* therefore the presence of various other fungi on these specimens may be worth mention, although none is in sufficient quantity or in good enough condition for a specific identification: *Lophodermium* sp., *Trybli-daria* sp., *Orbilia* sp., *Phragmonaevia* sp. and *Stictis* sp.

2. **Propolidium salmoneum** sp. nov.

Apothecia densely gregarious, slightly beneath the surface, opening by irregular lobes which remain to form a lacerate margin around the hymenium, 1–2 × 1 mm. elliptical or oblong; hymenium pale ochraceous salmon to salmon buff, white-pruinose; asci broad-cylindrical, with the wall conspicuously thickened at the apex, short-pedicellate, 8-spored, 55–65 × 9–10 μ; ascospores cylindrical, straight or slightly curved, slightly narrowed and rounded at the ends, irregularly 2–3-seriate, 3–7-septate, 15–26 × 3–4 μ; paraphyses filiform, branched near the tips and subcircinate; hypothecial layer hyaline, plectenchymatic, 10–20 μ thick.

Apothecia dense gregaria, subimmersa, elliptica vel oblonga, 1–2 mm. longa, 1 mm. lata; hymenium ochraceo-salmoneum, albo-pruinosum, epidermide fissa

lobata cinctum; asci late cylindrici, pariete ad apicem valde incrassato, breve pedicellati, octospori, 55–65 μ longi, 9–10 μ lati; ascosporae cylindricae, rectae vel subcurvatae, utrinque leniter attenuatae, 2–3-seriatae, 3–7-septatae, 15–26 μ longae, 3–4 μ latae; paraphyses filiformes, ad apices ramosae et subcircinatae; hypothecium hyalinum, plectenchymaticum, 10–20 μ crassum.

On decorticated wood, Clermont, Mar. 6, 1942, C. L. Shear *1388*.

P. salmoneum is strikingly similar in general appearance to *Propolis faginea* [Schrad.] ex Karst., from which it may readily be distinguished by the small asci and narrow, septate spores. The interpretation by different authors of the genera of the Stictidaceae having elongate, septate spores varies greatly, and keys to these genera are difficult to follow. The fungus in question appears to agree most nearly with *Propolidium* Sacc. (not Rehm), with the exception of the several-septate spores. In the type species, *P. glaucum* (Ellis) Sacc., the spores are uniseptate; however Saccardo later included in *Propolidium* species having spores with several septa; this broader conception of the genus would, therefore, allow the species to be included here.

3. **Cryptodiscus Sambuci** sp. nov. (FIG. 2)

Apothecia elliptical-fusoid, 0.5–1 × 0.2–0.5 mm., scattered or gregarious in whitened areas of decorticated wood, deeply immersed and only partially emerging between the fibers, with no well-defined exciple, the swollen host tissue forming a raised margin; hymenium flesh colored to flesh ocher; asci cylindrical-clavate, gradually narrowed toward the base, the wall thickened and rounded at the apex, 8-spored, 65–75 × 6–8 μ; ascospores irregularily 2–3-seriate, hyaline, cylindrical-fusoid, 5–7-septate, 15–20 × 3–3.5 μ; paraphyses filiform, hyaline, simple or branched, slightly thickened at the tips; hypothecium hyaline, thin, plectenchymatic; entire hymenium colored pale blue with iodine.

Apothecia elliptico-fusoidea, 0.5–1 mm. longa, 0.2–0.5 mm. lata, sparsa vel gregaria, in ligno decorticato dealbato profunde immersa, inter fibras submergentia; hymenium carneo-ochraceum, ligno tumido prominente cinctum; asci cylindrico-clavati, basim versus gradatim attenuati, apice crasse tunicati, octospori, 65–75 μ longi, 6–8 μ lati; ascosporae irregulariter 2–3-seriatae, hyalinae, cylindrico-fusoideae, 5–7-septatae, 15–20 μ longae, 3–3.5 μ latae; paraphyses filiformes, hyalinae, simplices vel ramosae, apice leniter incrassatae; hypothecium hyalinum, tenue, plectenchymaticum; hymenium totum jodi ope pallide azurescens.

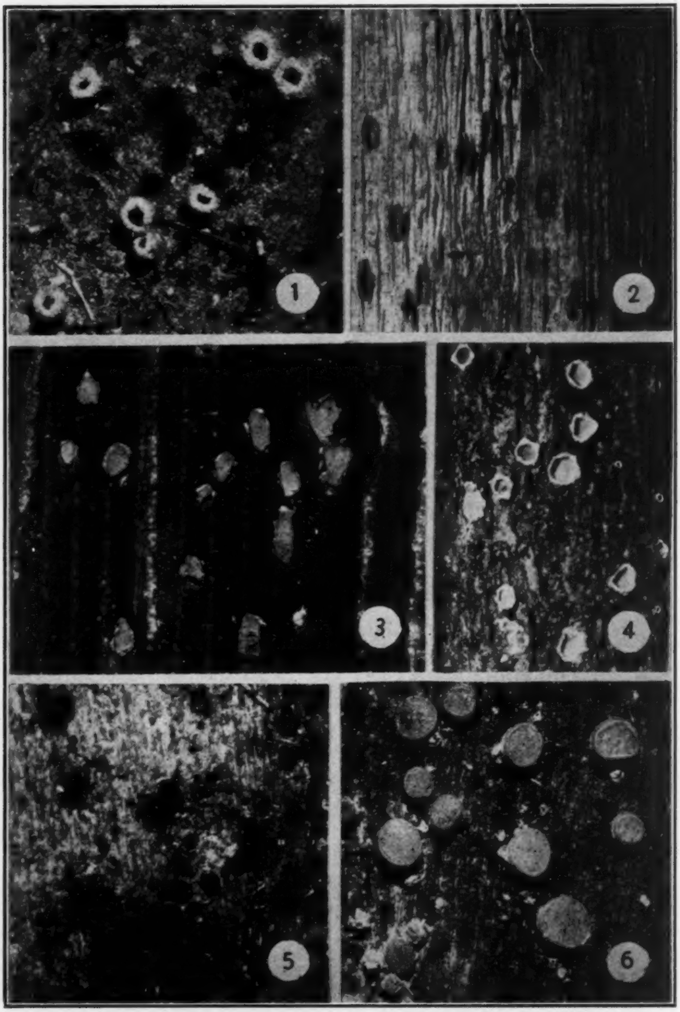

FIG. 1, *Dasyscyphella subcorticalis* on *Xanthoxylon fagara* (× 14); 2, *Cryptodiscus Sambuci* on *Sambucus* sp. (× 8); 3, *Nemacyclus culmigenus* on *Panicum* (× 9); 4, *Stictis Sagaretiae* on *Sagaretia minutiflora* (× 8); 5 and 6, *Corynella atrovirens* on *Sambucus* sp. (× 7).

On decorticated stems of *Sambucus* sp., Winter Park, Feb. 8, 1940, Feb. 16 and Feb. 17, 1941, C. L. Shear *1389* (*Type*), *1390* and *1391*.

Superficially the fungus resembles *Cryptodiscus pallidus* (Pers. ex Fries) Corda, but differs in the longer, narrower, 5–7-septate spores.

4. **Nemacyclus culmigenus** Ellis & Langl. (FIG. 3)

On *Panicum* sp., Vero, Dec. 18, 1938, C. L. Shear *1392*; on *Andropogon* sp., Winter Park, Feb. 18 and 19, 1941, and Jan. 29, 1942, *1393*, *1394*, and *1395*.

These Florida specimens have been compared with the type collection (Langlois *1443*) from the Langlois herbarium in the Mycological Collections of the Bureau of Plant Industry. *N. culmigenus* was described (*1*, p. 151) on *Panicum proliferum*, but is apparently not confined to this host genus, since apothecia found on *Andropogon* do not seem to differ essentially from those on *Panicum*. The fungus has also been collected recently on *Andropogon scoparius* at Athens, Georgia, by Dr. J. H. Miller. The elongate fruiting bodies opening by a slit or lobes to expose the greenish-pruinose hymenium, and the short asci distinguish the species from the other Stictidaceae occurring on grasses.

5. **Stictis Serenoae** sp. nov.

Apothecia sparse, orbicular, 0.2–0.6 mm. in diameter, the epidermal covering at first raised in a hemispherical dome, then splitting in three to five lobes which turn back and form a dentate border around the marguerite yellow, pruinose hymenium; asci cylindrical, narrowed at the base and apex, 8-spored, 55–65 × 5–8 μ; spores parallel, filiform, straight, hyaline, multiguttulate, 50 × 1–1.5 μ; paraphyses filiform, hyaline, unbranched, slightly enlarged and yellowish at the tips, coalescing to a form a subhyaline epithecium.

Apothecia sparsa, orbicularia, immersa, 0.2–0.6 mm. in diam., primum epidermide hemisphaericaliter elevata tecta, dein erumpentia et eaque stellatim fissa cincta; hymenium flavidum, pruinosum; asci cylindrici, basim apicemque versus attenuati, octospori, 55–65 μ longi, 5–8 μ lati; ascosporae filiformes, paralleles, rectae, multiguttulatae, hyalinae, 50 μ longae, 1–1.5 μ latae; paraphyses filiformes, hyalinae, simplices, ad apicem flavidulae et leniter inflatae, epithecium formantes.

On leaves of *Serenoa serrulata*, Winter Park, Jan. 9, 1941, C. L. Shear *1396* (*Type*), Jan. 3, 1942, Jan. 22, 1943, and Feb. 3, 1943, *1397*, *1398* and *1399*.

6. **Stictis Sagaretiae** sp. nov. (FIG. 4)

Apothecia sparse or densely gregarious, immersed, orbicular, 0.5–1 mm. in diameter, margin thin, entire or lobate, white; hymenium wood brown to buffy brown, drying dark olive buff; asci cylindrical-fusoid, abruptly narrowed at the base and apex, 8-spored, 65–80 × 7–11 μ; ascospores hyaline, parallel, multiseptate, 55–65 × 3–4 μ, strongly helicoid after leaving the ascus; paraphyses numerous, closely septate, simple or branched near the apex, 1 μ in diameter; hymenium staining blue with iodine.

Apothecia sparsa vel gregaria, immersa, orbicularia, 0.5–1 mm. diam., margine tenui, integro vel lobato, albo; hymenium ex avellaneo olivaceum; asci cylindrico-fusoidei, ad apicem et basim abrupte attenuati, octospori, 65–80 μ longi, 7–11 μ lati; ascosporae hyalinae, dense septatae, ex ascis valde helicoideae, 55–65 μ longae, 3–4 μ latae; paraphyses numerosae, simplices vel ramosae, 1 μ in diam.

On twigs of *Sagaretia minutiflora*, Highlands Hammock, Feb. 3, 1937, C. L. Shear *433* (*Type*), and Feb. 22, 1937, *791*.

S. Sagaretiae appears to be similar in some respects to *S. elegans* Grelet which differs, according to the description (*2*, p. 206), in the fimbriate margin and pale hymenium. *S. Puiggarii* Speg. has longer asci and spores. No specimens of either of these two species have been examined.

7. **Schizoxylon Betheli** (Ellis & Ev.) comb. nov.

Agyriella Betheli Ellis & Ev. Bull. Torrey Club **24**: 470. 1897.
Agyriopsis Betheli (Ellis & Ev.) Sacc. & Syd., Sacc. Syll. Fung. **14**: 805. 1899.

On twigs of *Abrus precatorius*, Avon Park, Jan. 19, 1937, C. L. Shear *77* and *79*.

The type specimen of *Agyriella Betheli* Ellis & Ev. in the Bethel Collection of the Division of Forestry Pathology is on *Bigelovia graveolens* collected at Ft. Garland, Colorado, E. Bethel *340-A*. The fungus was originally described as having hyaline paraphyses, sparingly branched and not noticeably thickened; however examination of Bethel's *340-A* shows that in mature apothecia the para-

physes are swollen, branched and greenish-brown at the tips. Four-spored and more rarely two-spored asci were found in the Florida specimens. The spores break up in the ascus into segments 3–5 μ long. Since the essential characters agree with those of *Schizoxylon* it seems advisable to transfer the species to that genus. *Schizoxylon dermateoides* Rehm is a similar fungus, which was thought from the description (6, p. 336) might possibly be identical. However, examination of type material from the Fairman Collection in the Cornell Herbarium sent by Dr. H. M. Fitzpatrick demonstrated that *S. dermateoides* has larger apothecia and much longer asci with acute apices, and can scarcely be considered the same species.

8. **Dasyscyphella subcorticalis** (Pat.) comb. nov. (FIG. 1)

Erinella subcorticalis Pat. in Duss Énum. Méth. Champ. Guadeloupe, p. 67. 1903.

On dead stems of *Xanthoxylon fagara*, Mar. 8, 1937, C. L. Shear *893*; on *Persea* sp. (?), Feb. 22, 1937, *811*, and on unknown host, March 4, 1941, *1400*, all at Highlands Hammock; on dead stems, Royal Palm Park, Dec. 15, 1938, *1401*, and Castellow Hammock, Mar. 16, 1942, *1402*.

Patouillard's fungus was described from Guadeloupe, and has not previously been reported from the United States, so far as the writer has been able to find. Through the courtesy of Drs. D. H. Linder and W. L. White, opportunity was afforded to compare the Florida collections with one of Patouillard's original specimens, *509*, and they were found to agree perfectly in all microscopic details. In the original description the hymenium is said to be golden yellow ("jaune d'or"), while the Ridgway color readings of the Florida specimens range from pinkish-buff to orange cinnamon. Since, however, hymenium color is known to vary under different conditions, this slight discrepancy is not regarded as of sufficient importance to separate the Florida collections from Patouillard's species, particularly in view of their complete agreement in other respects.

If *Dasyscyphella* is maintained as distinct from *Erinella*, the filiform paraphyses of *E. subcorticalis* would place it in the former genus.

9. **Corynella atrovirens** (Pers. ex Fries) Boud. (FIG. 5–6).

On decorticated wood of *Sambucus* sp., Winter Park, Dec. 5, 1938, C. L. Shear *1403*.

Although reported by Schweinitz and Curtis from North Carolina and by Cooke and Ellis from New Jersey, this species appears to have been collected only rarely in the United States, the only fairly recent record being that by Kauffman (*3*, p. 216) from Michigan.[2] It may well, however, have been listed under some different name that has escaped notice, since it has been placed in nearly a dozen genera in several families of the Discomycetes. Nannfeldt (**4**, p. 194, 199, 203) has added several names to its synonymy.

The Florida specimen agrees with Phillips Elvellacei Britannici *141*, issued as *Calloria atrovirens*, and with the descriptions given by European authors. The young apothecia in Dr. Shear's collection are densely furfuraceous, sometimes nearly covered by a mass of fine yellowish-green hyphae. When moist the hymenium is olivaceous, becoming reddish-brown on drying. The primary spores are subfusoid, straight or curved, multiseptate, 15–16 × 2–3 μ, the secondary spores curved, 2 × 1 μ.

10. **Leciographa floridana** sp. nov.

Apothecia single or in groups of two or three, erumpent from cracks in the bark, subsessile, corky to carbonaceous, brittle when dry, patellate, convex when moist, 0.7–1.2 mm. in diameter; hymenium natal brown to clove brown, slightly roughened by protruding asci; margin smooth, narrow, blackish brown; asci cylindrical-clavate, entire wall staining deep blue with iodine, gradually narrowed toward the base, wall thickened at the apex, 8-spored, 90–110 × 18–20 μ; ascospores fusoid, brown, irregularly 2–3-seriate, 7–9-septate, 35–41 × 8–9 μ, the end cells subhyaline; paraphyses filiform, much branched, thickened and brown at the tips, interwoven to form a thick, brownish epithecium; hypothecium pale brown, prosenchymatic, intermediate layer 50–100 μ thick, composed of thin-walled, subglobose or angular cells 10–15 μ in diam.; cortex a dense brown pseudoparenchyma, made up of cells 7–9 μ in diam.

Apothecia solitaria vel gregaria, ex rimis corticis erumpentia, subsessilia, patelliformia, suberosa vel carbonacea, 0.7–1.2 mm. diam.; hymenium rufo-

[2] For these and other references, the writer is indebted to Dr. W. L. White.

brunneum, margine glabro, angusto, atro-brunneo circumdatum; asci cylindrico-clavati, basim versus gradatim attenuati, ad apicem crasse tunicati, jodi ope intense coerulescentes, octospori, 90–110 μ longi, 18–20 μ lati; ascosporae late fusoideae, brunneae, irregulariter 2–3-seriatae, 7–9-septatae, 35–41 μ longae, 8–9 μ latae, cellulis ultimis subhyalinis; paraphyses filiformes, multiramosae, ad apices incrassatae, intertextae et epithecium crassum brunneum formantes; hypothecium fuscidulum, prosenchymaticum; stratum intermedium 50–100 μ crassum, e cellulis tenuibus subglobosis vel angularibus 10–15 μ in diam. compositum; stratum corticale densum, brunneum, pseudoparenchymaticum.

On dead, partly decorticated branches of *Liquidambar styraciflua*, Longwood, Jan. 2, 1941, C. L. Shear *1404*.

The large fusoid spores, abruptly narrowed at the ends and with hyaline or subhyaline tips, are the most characteristic feature of this fungus. Similar spores are present in *Patellaria calliospora* Penz. & Sacc. described from Java, which may possibly be identical. No specimens are available for comparison, but judging from the description and illustration (**5**, p. 90, *pl. 60, fig. 2*) the species from Java differs in thicker spores.

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A NEW SPECIES OF CLAVICEPS ON CAREX [1]

J. Walton Groves [2]

(WITH 2 FIGURES)

The occurrence of a species of *Claviceps* in the ovaries of *Carex stellulata* var. *angustata* Carey (= *C. angustior* Mack.) was reported by Groh (**1911**). He did not give the species a name as the perithecial stage was not observed, but he illustrated the sclerotia as they occur on the host and suggested that it might be close to *Claviceps nigricans* Tul. occurring on species of *Eleocharis* and *Scirpus*.

Subsequent collections of this ergot were received by the Division of Botany and Plant Pathology from Quebec in 1934, 1935, 1939, and from Anticosti Island in 1936. In all of these collections the sclerotia were found to be almost entirely destroyed by the larvae of an insect. Lepage (**1938**) reported the insect *Acylomus ergoti* Csy. on ergots of *Carex*, said to be *Claviceps caricina* Griffiths.

C. caricina was described by Griffiths (**1902**) and distributed in Griffiths' West American Fungi *400*. Examination of this specimen disclosed sclerotia very different from those of Groh's collection, and occurring in the culms, not in the ovaries. Groh stated that *C. caricina* Griff. was the fungus known as *Sclerotium sulcatum* Desm. and this was confirmed by Whetzel (**1929**). The latter demonstrated that *S. sulcatum* was the sclerotial stage of a *Sclerotinia* and included both *S. sulcatum* and *C. caricina* as synonyms of *Sclerotinia Duriaeana* (Tul.) Rehm. It is, therefore, evident that the identification of Lepage's fungus as *C. caricina* is a misdetermination, since he obviously had a true ergot and undoubtedly the same species as that described in this paper.

In 1939 Mr. Groh again collected this ergot on *Carex* near Milner, B. C. and sent a large collection for examination. Most

[1] Contribution No. 743 from the Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Canada.

[2] Agricultural Scientist, Central Laboratory, Ottawa.

of these sclerotia were also infested with the insect larvae, but on going over the material carefully a number of sound sclerotia were found. These were placed on moist sand in a culture dish and put in a refrigerator at 0° C. on Aug. 5, 1939. On Nov. 10, 1939 they were removed from the refrigerator and transferred to the greenhouse. The temperature in the greenhouse varied from 4°–15° C. and the dishes were shaded from direct sunlight.

The first evidence of the development of perithecial stromata was observed on Dec. 26, 1939. The stroma was at first rounded, fleshy, colorless, about 0.5–1.0 mm. in diameter, soon becoming pinkish, "salmon color" to "buff pink" (Ridgway), very similar in color to the common *Tubercularia vulgaris* Tode. These pinkish heads increased in diameter and became raised on blackish-violet stalks. In about three weeks the ostioles of the perithecia were visible as darker orange dots on the head, but mature ascospores were not found until Jan. 26, 1940, a full month after the first appearance of the stromata.

It was thought that inoculation experiments might give some clue as to the identity of this fungus. The only material available at the time the perithecia were mature was some wheat plants growing in pots in the greenhouse. Some of the heads in which anthers were showing were inoculated with an ascospore suspension in sterile water, but the results were negative. This result is not regarded as positive proof of the inability of the *Carex* ergot to infect wheat flowers.

Brefeld (**1891**) and others have shown that conidia of *Claviceps purpurea* (Fries) Tul. are readily produced in culture. Accordingly ascospore cultures of this fungus were made with the hope of obtaining conidia for use in further inoculation experiments. Unfortunately these cultures were killed shortly afterwards by a sulphur dioxide leak in the low temperature chamber in which they were stored.

The ascospores germinated readily and gave good mycelial growth on potato dextrose agar. The colonies were white, rather slow-growing, more or less convoluted and with little aerial mycelium. They were somewhat similar in appearance to the cultures of *C. purpurea* illustrated by Bonns (**1922**, *pl. XVI*, *fig. 3*). Up to the time they were lost they had not developed any color.

As noted above, it was suggested by Groh (**1911**) that this species might be close to *Claviceps nigricans* Tul. occurring on *Elocharis* and *Scirpus*. Several collections of sclerotia of this species, including both European and American specimens, have been examined. The sclerotia were, as a rule, more slender than those of the *Carex* form. They were mostly about 1 mm. in diameter and did not exceed 1.5 mm. whereas the sclerotia on *Carex* were up to 3 mm. in diameter. It is questionable, however, whether any taxonomic significance could be attached to this difference.

It has not been possible to examine the perithecia of *C. nigricans*. No account of the perithecial stage is known to the writer apart from the original description and figures of Tulasne (**1853**). Seaver (**1910**) stated that the perithecia had not been observed in North America, and Petch (**1938**) had no record of them for Great Britain. Tulasne did not give measurements of the asci and spores. He distinguished the species chiefly on the basis of the color, "Je la désignerai par le nom de *Claviceps nigricans*, à cause de la couleur très sombre, d'un violet presque noir, qui affecte toutes ses parties, mêmes dès ses premiers commencements."

It is impossible to reconcile the colors observed in the perithecial stromata of this species with this statement of Tulasne, and it is, therefore, concluded that this species is distinct from *C. nigricans*.

The colors of the *Carex* ergot are similar to those of *Claviceps purpurea* as described by Whetzel and Reddick (**1911**). Two specimens with good perithecial material of *C. purpurea* have been examined, Rehm Ascom. *1380*, and a Danish specimen from O. Rostrup in the Mycological Herbarium of the Division of Botany and Plant Pathology, Department of Agriculture, Ottawa. Both of these were collected on *Glyceria fluitans* (L.) R. Br. They were very similar morphologically to the *Carex*-inhabiting species and no clearly marked differences could be found.

It would seem noteworthy, however, that in the examination of a large number of collections of sclerotia of *C. purpurea* from various hosts, no evidence of larval infestation could be found, whereas it has been very difficult to find sclerotia of the *Carex*

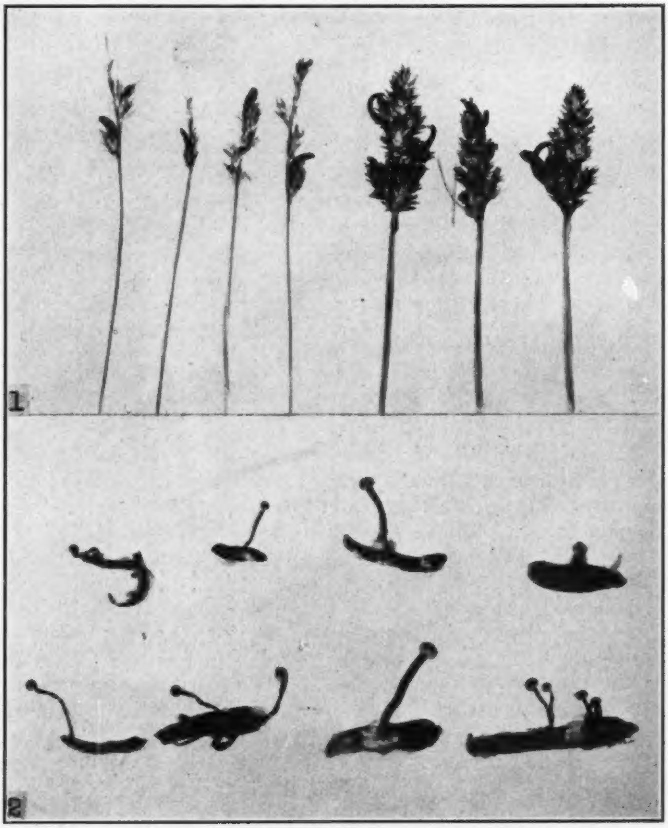

FIG. 1, sclerotia of *Claviceps Grohii* on two species of *Carex*, × 1; 2, perithecial stromata of *C. Grohii*, × 2.

species free from larvae.[3] This would indicate a very distinct physiological difference. Furthermore *C. purpurea* has never been shown to infect hosts other than Gramineae and it would seem to be an unjustifiable assumption to extend its host range to the Cyperaceae unsupported by cultural evidence. In addition a certain amount of specialization within the host genus *Carex* is indicated by the fact that all of the species reported below

[3] Evidence of larval infestation was observed in some collections of sclerotia of *C. nigricans*.

as hosts fall within the groups having more than one flower spike and plano-convex rather than triangular achenes.

It has, therefore, been decided to describe the *Carex* ergot as a new species and to name it in honor of Mr. Herbert Groh who first recorded its occurrence and thirty years later provided the material from which the perithecial stage was obtained.

Claviceps Grohii sp. nov.

Sclerotiis semicylindricis, curvulis vel fere rectis, 5–15 mm. longis, 1–3 mm. diam., atro-violaceis; stipitibus flexuosis, glabris, 4–15 mm. longis, 0.2–0.5 mm. diam., atro-violaceis vel atro-brunneis; capitulis subglobosis, carnosis, "buff-pink" vel "orange vinaceous" (R), ab ostiolis prominulis obscurioribus punctulatis; peritheciis immersis, ovoideis, 150–300 × 100–150 μ; ascis cylindraceis, flexuosis, apice rotundatis, basi attenuatis, octosporis, (100)–125–160–(175) × 5–6 μ; ascosporis hyalinis, filiformibus, continuis, (75)–90–125 × 1.0–1.5 μ.
Hab. in ovariis *Caricis* spp.

Sclerotia semicylindric, usually more or less flattened on one side, curved or nearly straight, 5–15 mm. in length, 1–3 mm. in diameter, blackish violet, close to "dark heliotrope slate" to "dull purplish black," "pinkish buff" to "pale pinkish buff" within; perithecial stromata one to several from a sclerotium, stalks 4–15 mm. in height, 0.2–0.5 mm. in diameter, blackish violet to blackish brown, glabrous except for a tuft of pale violet mycelium at the base, compressed and twisted when dry, the heads more or less globose, 0.8–2.0 mm. in diameter, fleshy, "buff-pink" to "orange vinaceous," rough-punctate with the darker orange perithecial ostioles; perithecia immersed, ovoid, 150–300 × 100–150 μ; asci cylindric, flexuous, rounded above, narrowed below, eight spored, (100)–125–160–(175) × 5–6 μ; ascospores hyaline, filiform, continuous, (75)–90–125 × 1.0–1.5 μ.

Host: in the ovaries of *Carex* spp., *C. angustior* Mack., *C. brunnescens* Poir., *C. muricata* L. (?), *C. scirpoides* Schkuhr., *C. stellulata* Good.; (fide Lepage) *C. stipata* Muhl., *C. tribuloides* Wahl.

SPECIMENS EXAMINED: Mycological Herbarium of the Division of Botany and Plant Pathology, Department of Agriculture, Ottawa. *12072*, Type. On *Carex stellulata* Good., Milner, B. C., Coll. H. Groh, July, 1939, Perithecia produced Jan. 1940.

Sclerotia only—*2389*, *2744*, Rimouski, Que.; *4313*, Beauce Co., Que.; *4319*, Ste. Anne de la Pocatiere, Que.; *5673*, Beauceville, Que.; *5927*, Anticosti Island; *12073*, Aldergrove, B. C.

CENTRAL EXPERIMENTAL FARM,
OTTAWA, ONTARIO

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SOME EVIDENT SYNONYMOUS RELATIONSHIPS IN CERTAIN GRAMINICOLOUS SMUT FUNGI [1, 2]

George W. Fischer [3]

(with 4 figures)

INTRODUCTION

In the various taxonomic treatments of the smut fungi many flagrant cases still exist where synonymous relationships have gone unrecognized or unheeded. There is still a strong tendency in studies of the smut fungi to place too much emphasis on the host plant in the delimitation of species, and to give too little recognition to the possibility of the existence of physiologic and slight morphologic variants within species. In the one case species are sometimes separated solely on supposed specialization to a single genus of plants, and in the other, species are separated by a demonstration of insignificant biometric differences. Both of these methods have contributed to the recognition of many species that are not valid on purely morphologic grounds. Some species defy determination if the host plant is not known to genus and sometimes even to species. Or one would be obliged to measure at least 200 spores in order to arrive at a species determination. Such a condition does not exist in many other well recognized and thoroughly studied plant pathogens. For example any of the common cereal rust species (*Puccinia graminis* Pers., *P. rubigo-vera* (DC.) Wint., *P. glumarum* (Schm.) Erikss. & P. Henn., and *P. coronata* Corda.) are readily identified without any reference

[1] Coöperative investigations between the Division of Forage Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture, and the Washington Agricultural Experiment Station, Pullman, Washington. Published as Scientific Paper no. *552*, College of Agriculture and Agricultural Experiment Station, State College of Washington.

[2] The nomenclatural details in this paper have been supplied by Mr. John A. Stevenson, Division of Mycology and Disease Survey, for which grateful acknowledgment is here made.

[3] Associate Pathologist, Division of Forage Crops and Diseases.

to host plants and these are numerous for each species. Powdery mildew (*Erysiphe graminis* DC.) of cereals and grasses is readily recognized and identified without reference to host plant, as are also other powdery mildews and downy mildews which have numerous host species.

It is the purpose of this paper to call attention to some of the instances of unrecognized or unheeded synonomy in the grass and cereal smuts and to recommend desirable consolidations.

USTILAGO AVENAE, U. PERENNANS, AND U. NIGRA

Fischer and Holton (**5**) recently recommended the uniting of *Ustilago Avenae* (Pers.) Jens. (loose smut of oats) and *U. perennans* Rostr. (smut of *Arrhenatherum elatius* (L.) Mert and Koch)

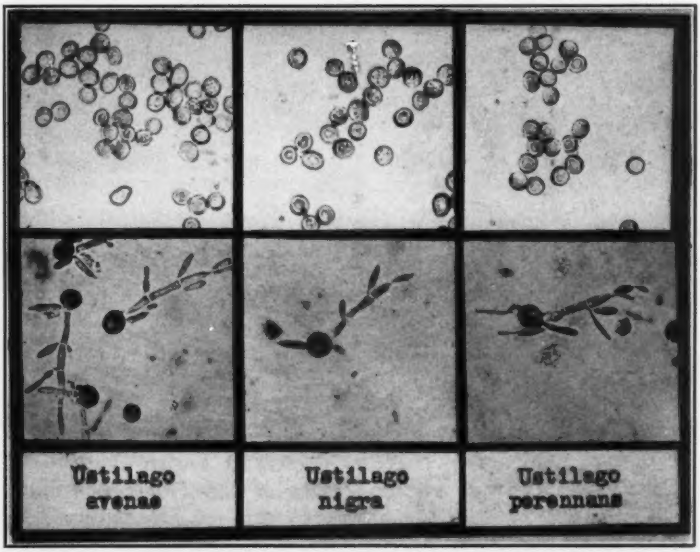

FIG. 1. Spores and germinating spores of *Ustilago Avenae*, *U. nigra*, and *U. perennans* showing comparative morphology. Each species photographed under same conditions of equipment, lighting, and magnification. × about 400.

because of demonstrated genetic relationship and morphological identity. Further study has now indicated that *U. nigra* Tapke (**7, 8**) should be included in the consolidated species. This latter

form causes a black loose smut which, in our present state of knowledge, is confined to barley (*Hordeum vulgare* L.) and certain grasses also of the tribe Hordeae (**3**, **8**). The symptoms are the same, the fungus causing a typical dark-brown to black loose smut on the several hosts involved and the life history of the organism is essentially the same in all. As seen in figure 1, *U. perennans*, *Avenae*, and *U. nigra* are indistinguishable morphologically and for this as well as for the reasons previously mentioned, it is proposed that the three be considered merely as specialized varieeties of one morphological species.

The legitimate binary name under the provisions of the International Rules of Botanical Nomenclature would appear to be *Ustilago Avenae* (Pers.) Rostr., with pertinent synonomy as indicated hereafter. It is regretted that priority will not permit the use of Tapke's specific epithet *nigra*, since it is descriptive of the dark brown to black sori of this species; while on the other hand *Avenae* implies specialization to the genus *Avena*.

Ustilago Avenae Jens. as listed in Jensen's paper Le Charbon des Cereales, p. 4, 1889 is the binomial cited for this smut but since Jensen does not indicate whether he is basing his name on Persoon's subspecies or is naming it "de nova," the Rostrop combination is to be preferred. Biedenkopf's *U. medians* is based on a mixture of barley smuts (**8**) and the name is rejected as a *nomen ambiguum*. Other names applied to the form on *Arrhenatherum* including *Ustilago decipiens* (Wallr.) Liro and *U. Holci-avenacei* (Wallr.) Cif. are likewise not available on the basis of priority.

Zundel (9) reduces *U. nigra* Tapke to synonymy under *U. nuda* Rostr., which also causes a loose smut of barley, but whose characteristics of spore germination, life history and control mark it as entirely distinct. Its relationships are discussed later on in this paper.

USTILAGO AVENAE (Pers.) Rostr. Overs. K. Danske Vid. Selsk. Forh. **1890**: 13. Mar. 1890.

Uredo segetum subsp. *Avenae* Pers. Syn. Fung. p. 224. 1801.

Uredo segetum forma *decipiens* Wallr. Ann. Bot. p. 139. 1815.

Erysibe vera var. *Holci-avenacei* Wallr. Fl. Crypt. Germ. **2**: 217. 1833.

Ustilago Avenae Jens. Le Charbon des Cereales, p. 4. 1889.
Ustilago perennans Rostr. Overs. K. Danske Vid. Selsk. Forh. **1890**: 15. March 1890.
Ustilago Avenae Jens. ex Kellerm. & Swing. Ann. Rept. Kans. Agric. Expt. Sta. **2**: 215. June, 1890.
Ustilago medians Biedenk. Zeits. Pflanzenkr. **4**: 321. 1894.
Ustilago decipiens Liro, Ann. Acad. Sci. Fenn. A. **17**: 95. 1924.
Ustilago nigra Tapke, Phytopath. **22**: 869. 1932.
Ustilago Holci-avenacei Cif. Fl. Ital. Crypt. **1** (17): 293. 1938.

USTILAGO HORDEI AND U. KOLLERI (U. LEVIS)

Ustilago Hordei (Pers.) Lagh. and *U. Kolleri* Wille, the latter commonly referred to by American workers as *U. levis* (Kellerm.

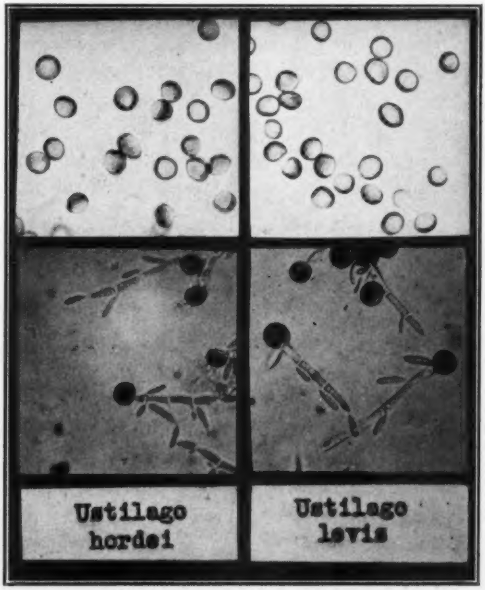

FIG. 2. Spores and germinating spores of *Ustilago Hordei* and *U. levis* showing comparative morphology. Both species photographed under same conditions of equipment, lighting, and magnification. × about 400.

& Swing.) Magn., are two morphologically identical forms causing "covered" smuts of barley and oats respectively. Both forms

have small spores (5–8 μ in diameter) which are smooth and generally lighter colored on one side (FIG. 2). These two forms, therefore, are separable entirely on a host specialization basis, the one occurring on cultivated barley (*Hordeum* spp.) and certain other grasses of the tribe Hordeae (**2**, **3**); the other on *Avena* spp. Since these two forms are not distinct morphologically it is recommended that they be considered specialized varieties of a morphological species which by priority should be designated as *U. Hordei* (Pers.) Lagh. It is unfortunate that circumstances do not permit the use of the descriptive epithet *levis* as *U. levis*, since it refers to the smooth nature of the epispore, the one morphological character which distinguishes *U. Hordei* from *U. Avenae*, with its echinulate spores.

USTILAGO HORDEI (Pers.) Lagerh. Mitt. Badeschen Bot. Ver. p. 70 1889.

Uredo segetum subsp. *Hordei* Pers. Syn. Fung. p. 224. 1801.

Ustilago Avenae var. *levis* Kellerm. & Swing. Ann. Rept. Kans. Agric. Exp. Sta. **2**: 259. 1890.

Ustilago levis Mag. Ber. Natur-Wiss.-Mediz. Ver. Innsbruck **21**: 22. 1894.

Ustilago Kolleri Wille, Bot. Notiser **1893**: 10. 1893.

USTILAGO TRITICI AND U. NUDA

Cultivated wheat (*Triticum* spp.) and cultivated barley (*Hordeum* spp.) are commonly and often seriously affected with loose smuts, of which the causal organisms have been known as *Ustilago Tritici* (Pers.) Rostr. and *U. nuda* (Jens.) Kellerm. & Swing., respectively. Both Cunningham (**1**) and Rodenhiser (**6**) have earlier proposed the consolidation of these two species. These "species" are identical in every way except pathogenicity. Both have small, spherical to subspherical spores (5–8 μ), which are minutely echinulate, and lighter colored on one side (FIG. 3). Both are characterized by "blossom infection" of the host plants, and the germination of the spores (on nutrient media or otherwise) to form a mycelium directly, without producing promycelia and sporidia. Such being the case, the loose smuts of wheat and barley, hitherto known as *U. Tritici* and *U. nuda*, respectively, should be regarded as specialized varieties of the same morphologic species, which by priority should bear the name *Ustilago Tritici* (Pers.) Rostr.

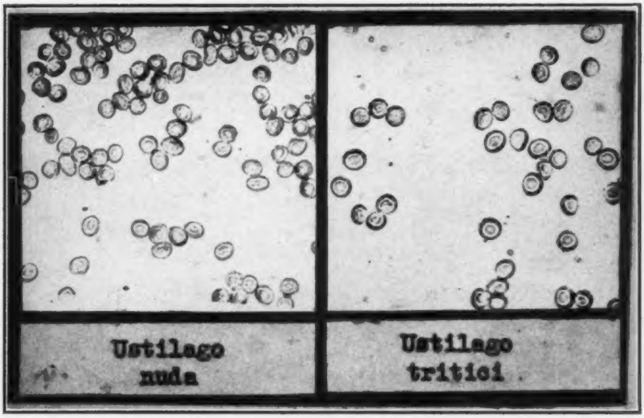

FIG. 3. Spores of *Ustilago nuda* and *U. Tritici* showing comparative morphology. Both photographed under same conditions of equipment, lighting, and magnification. × about 400.

USTILAGO TRITICI (Pers.) Rostr. Overs. K. Danske Vidensk. Selsk. Forh. **1890**: 15. March 1890.

Uredo segetum subsp. *Tritici* Pers. Syn. Fung. p. 224. 1801.

Ustilago segetum var. *nuda* Jens. Jour. Roy. Agric. Soc. England 24 (Ser. 2): 406. 1888.

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Ustilago nuda Kellerm. & Swing. Ann. Rept. Kans. Agric. Expt. Sta. **2**: 277. June 1890.

UROCYSTIS AGROPYRI, U. TRITICI, AND U. OCCULTA

Numerous grasses, cultivated wheat, and cultivated rye have long been subject to attack by a stripe smut (known popularly as flag smut) in North America, Europe, Asia, and Australia, the causal organisms of which have been known as *Urocystis Agropyri* (Preuss) Schroet., *U. Tritici* Koern., and *U. occulta* (Wallr.) Rab., respectively. The general symptoms of flag smut on the three groups of hosts are the same, and the three smut species themselves are morphologically indistinguishable except for a tendency of the spores of *U. occulta* to be incompletely invested by the

sterile cells. This morphological similarity of the three flag smut species has long been recognized, and they have been separated almost entirely on a host specialization basis. Recently, even this basis of separation has been partially broken down (4) when

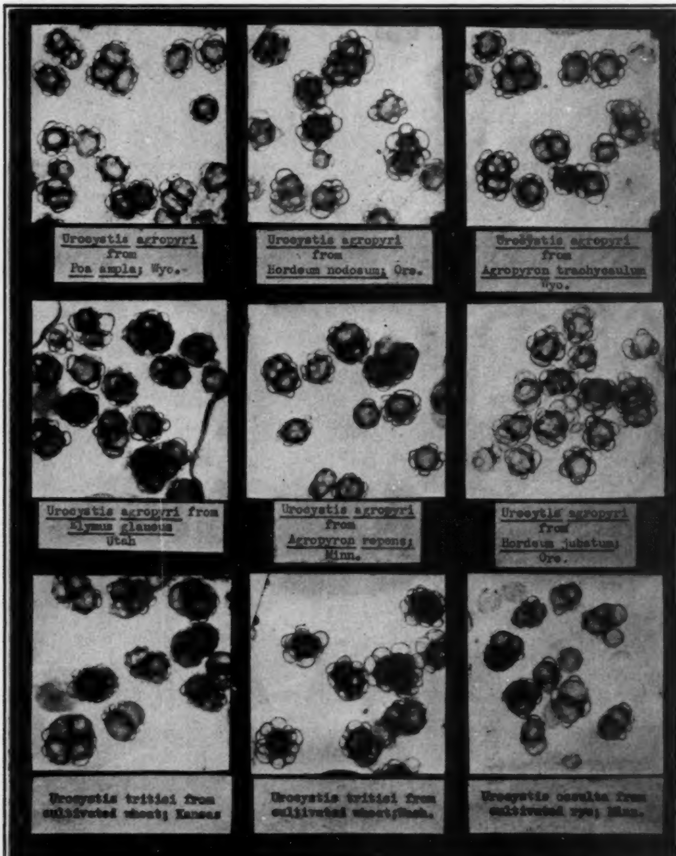

FIG. 4. Spore balls of *Urocystis Agropyri* (from various hosts and localities), *U. Tritici*, and *U. occulta*, showing comparative morphology. All photographed under same conditions of equipment, lighting, and magnification. × about 250. Retouched; that is, the faint outlines of some of the sterile cells were traced over with diluted India ink.

it was known that *U. Tritici* and *U. occulta* both will infect certain grasses.

A recent study, by the author, of dozens of specimens of the three flag smut species indicates that *Urocystis Agropyri* and *U. Tritici* are not morphologically separable, while *U. occulta* is fairly distinct because of the incomplete investment of the spore balls. Otherwise the three "species" are inseparable on the basis of size and shape of spore balls, number of spores therein contained, and in the size and shape of the spores themselves. Some idea of the comparative morphology of *U. Agropyri*, *U. Tritici*, and *U. occulta* may be seen in figure 4.

Urocystis Agropyri has been known to occur in the United States for several decades and over 30 species in 10 genera of grasses are known to be hosts. Herbarium specimens of flag smut under the name *U. Agropyri* from all of the 10 genera of grass hosts have recently been examined with the result that more variation was noted among the numerous collections of *U. Agropyri* than between this species as a whole and *U. Tritici*. Only a few of the specimens showed any tendency toward incomplete investment of the spore balls with sterile cells, as distinguishes *U. occulta*.

Since *Urocystis Agropyri* and *U. Tritici* are morphologically identical, it seems logical to consider them as one species. If the flag smut of wheat were to continue to be considered as a separate species then the smut on each of the ten other genera of grasses equally merits specific distinction. Thus there would result almost a dozen "species" causing flag smut, and probably none of them separable morphologically. Therefore, in view of this, and considering the demonstration (**4**) of the susceptibility of several species of grasses to *U. Tritici* it is recommended that this species and *U. Agropyri* be combined under the latter name which has priority. It might even be desirable to include *U. occulta* in the composite species, but at the present it seems preferable to keep it separate because of the incomplete investment of the spore balls by the sterile cells (FIG. 4).

UROCYSTIS AGROPYRI (Preuss) Schroet. Abh. Schles. Ges. Abth. Not. Med. **1869–72**: 7. 1870.

Uredo Agropyri Preuss in Sturm, Deutsch. Fl. III. **25**: 1. 1848.

Urocystis Tritici Koern. Hedwigia **16**: 33. 1877.

SUMMARY

Some evident cases of synonomy in certain graminicolous smut fungi are presented and desirable consolidations are recommended.

Ustilago nigra, *U. Avenae*, and *U. perennans*, causing dark brown to black loose smuts of barley, oats, and tall oatgrass, respectively, are considered as specialized varieties of a single morphologic species, which, according to International Rules of Botanical Nomenclature would bear the name *U. Avenae* although *U. nigra* would be more descriptive.

It is recommended that the covered smuts of barley and of oats, *Ustilago Hordei* and *U. Kolleri*, respectively, be considered as specialized varieties of a single morphologic species, which by priority would be called *U. Hordei*.

Emphasis is given to earlier proposals that *Ustilago Tritici* and *U. nuda*, causing loose smuts of wheat and of barley, respectively, be considered as specialized varieties of the same morphologic species, which by priority would bear the name *U. Tritici*.

Urocystis Agropyri, *U. Tritici*, and *U. occulta*, causing flag smuts of grasses, wheat, and rye, respectively, are shown to be very similar in morphology and in the effect on the host plants. In fact, the first two are considered identical, and it is recommended that they be consolidated under one name, which by priority would be *U. Agropyri*. *Urocystis occulta* seems to have one fairly constant distinguishing morphologic character in that the spore balls are more or less incompletely invested by the sterile cells, and at present it seems preferable to retain it as a separate species.

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STUDIES IN THE GASTEROMYCETES—IX. THE GENUS, ITAJAHYA IN NORTH AMERICA

W. H. Long and David J. Stouffer

(with 10 figures)

This paper reports the discovery of the genus, *Itajahya,* in North America, discusses the genus, gives a description of the North American plants and records data on their distribution.

While on a collecting trip during September, 1941, through the arid regions of Arizona and New Mexico, we found a phalloid which at a casual glance seemed to be a white form of *Phallus impudicus;* hence no special effort was made to collect many specimens. Later a closer study of the plant showed that it was not *P. impudicus*, but a form unknown to either of us. A special search was then made for as many specimens as we could find. We decided that it might be an *Itajahya*, but it seemed improbable that a tropical, wet climate plant could grow under such arid conditions.

On returning home a careful study of our phalloid proved conclusively that it did belong to the genus, *Itajahya*, in spite of its desert habitat. This is the first time this genus has been reported from North America.

Itajahya was first reported and described from Brazil by Alfred Moller (**1895**), found by him near Blumenau. Later the plant was recorded by Lloyd (**1907**) from Pelotas, another locality in Brazil, and finally Robert E. Fries (**1909**) reported the phalloid from Bolivia and Spegazzini (**1899**) listed a plant from Argentina under the genus name *Alboffiella* which Fries and others have decided is synonymous with *Itajahya.* Fries states that *Itajahya galericulata* is probably distributed over the greater part of the warmer regions of South America where conditions are favorable.

THE ARIZONA AND NEW MEXICO SPECIMENS

These plants have all the general characters of the genus, *Itajahya*, the white calyptra, lamellate plates, covered by the gleba

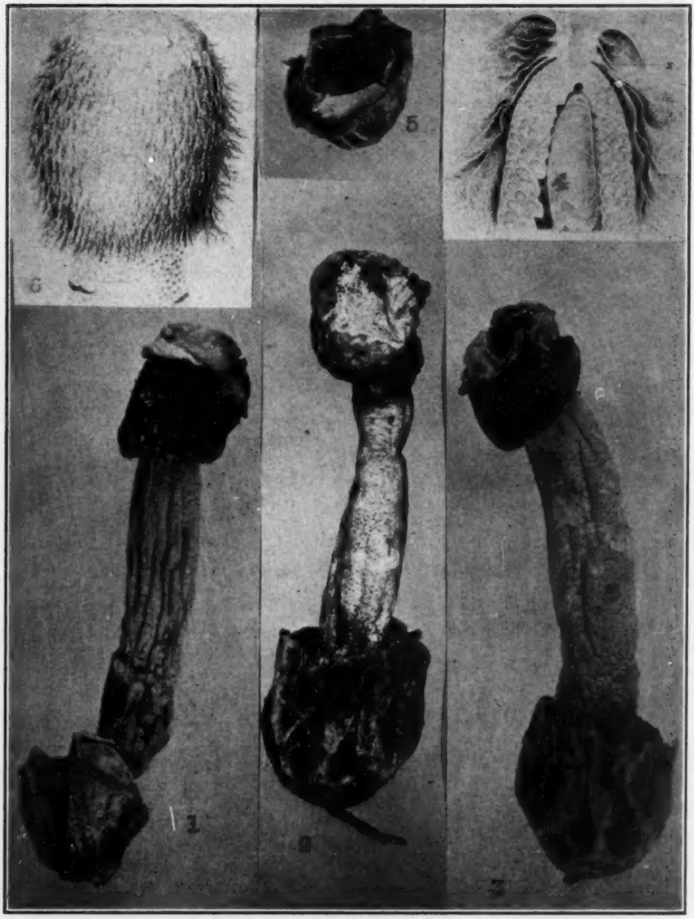
and permeating the inner structure of the pileus (FIG. 4), the white mottled surface of the gleba (FIG. 1, 3), the wig-like surface of the pileus when denuded of its gleba (FIG. 6) and the thick, stout stem with its many chambered walls (FIG. 8). They differ in usually having a well defined, membranous veil (FIG. 9), in a circumscissile volva (FIG. 2, 3, 7, 10) with the upper portion remaining as a cap over the pileus (FIG. 1, 2, 10), with pileus flattened on top (FIG. 2, 10) from the pressure of the volva when the plants elongate, and especially in having an entirely different habitat, since they grow in arid regions while the usual habitat in Brazil is a wet, humid region.

The presence or absence of a membranous veil is not of specific value since such well known phalloids as *Phallus impudicus*, *P. rubicundus* and others may or may not have this membranous veil, and even some of our *Itajahya* plants do not have it. The circumscissile volva and the flat top of the pileus are due to local conditions when the plants grow in arid regions as explained by Long in his Phalloideae of Texas (**1907** p. 113). The dry habitat was very unexpected, although Fries (l.c.) found these plants in Bolivia in abundance in dry, sandy locations where vegetation was very sparse, as well as in shady areas under thick shrubbery in rich humus. Such conditions approach those in which our plants were collected. Möller mentions plants with volva adhering to top of pileus. Lloyd (**1907**) describes and figures a plant with a volva cap on pileus, while Fries mentions and figures plants with the volva adhering to the top of the pileus. These various plants seem intermediate as to volva cap, between the usual naked pileus of Brazilian and the adnate volva cap of our North American plants. In view of the above data we have decided that our plants do not warrant the erection of a new species, but belong under *Itajahya galericulata* since all the differences found are minor and mainly due to the climatic conditions under which the plants grew.

ITAJAHYA GALERICULATA IN NORTH AMERICA

Sporophore when young (egg stage) ovate to subglobose, 2–3 cm. across by 3–5 cm. tall with a radicating base, originating 5–8 cm. below the surface of the soil, when mature and elongated consisting of a volva, stipe and pileus. *Volva* circumscissile (FIG.

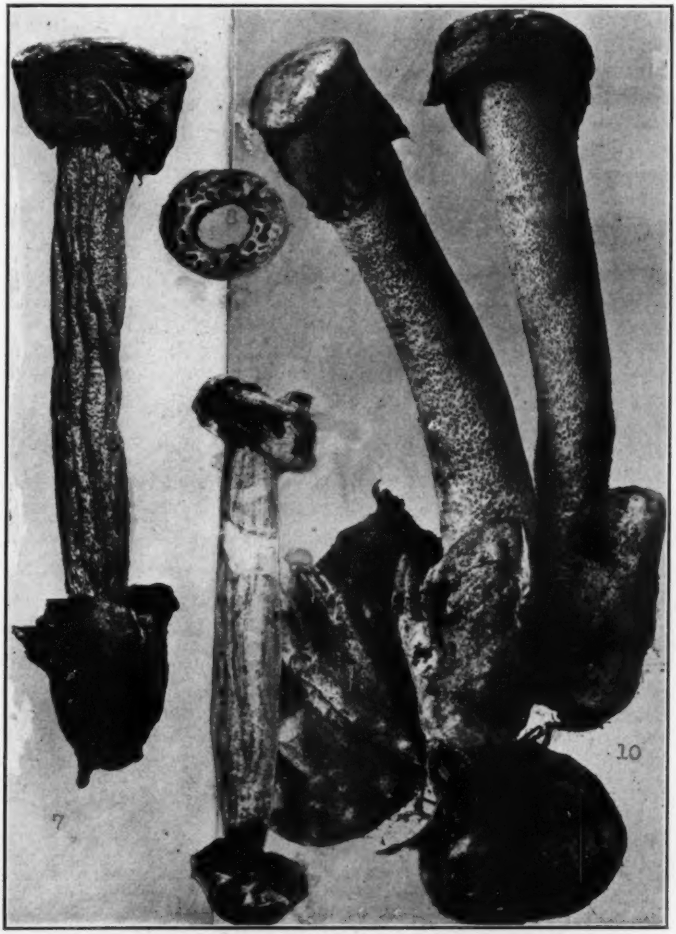
2, 3, 7), upper portion borne as a cap on top of the pileus when the plant elongates, often covering the entire gleba (FIG. 10), white with slight pink tinge when fresh becoming tilleul brown in age.



FIGS. 1–6. *Itajahya galericulata.*

Stipe cylindrical to somewhat fusiform, tapering rapidly to a point inside of volva cup, white when fresh changing to cartridge buff on drying, 4–15 cm. tall (many only 4–6 cm. tall) by 1½–2 cm. in

diameter in thickest portion (middle), stem cavity 7–15 mm. in diameter, expanding into a funnel inside pileus, 1–2 cm. wide at top, covered by the calyptra (FIG. 2), margin of funnel spreading



FIGS. 7–10. *Itajahya galericulata.*

over top of gleba as a crenulate white collar or border; *calyptra* white with dentate edges, covering entire top of pileus, 1–2½ cm. in diameter by 1–1½ mm. thick, tough, becoming free from the

collar but held in place by the volva cap; *walls* of stipe thick, tough, composed of isodiametric chambers which open outwardly as small pores while a few may open inwardly, 2–3 chambers thick at base of stem, 4–5 in middle of stem and 3–4 chambers thick at top. *Pileus* cylindrical-campanulate, 1–2½ cm. across by 1–2 cm. tall, flattened on top by the adhering volva cap (FIG. 10), often unsymmetrical, one half being larger than the other, undersurface white and free from the stem but often clasping the stem tightly. *Veil* thin, membranous, non-perforate, appearing as white bands of tissue on stem (FIG. 9) and as a white cup enclosing the base of the stem inside the volva cup (FIG. 5). *Gleba* when fresh olive gray to mouse gray turning black on deliquescing, moderately foetid, attached to underside of border and to the inside wall of pileus, formed of lamellate, overlapping trama plates which traverse the entire pileus and divide repeatedly (FIG. 4), terminating on the outer surface of the gleba as white, irregular spots giving the surface a mottled appearance (FIG. 1, 3); when the gleba is carefully washed off, the surface of the pileus takes on a wig-like appearance as shown in figure 6.[1] *Spores* 1.5–2 μ by 3–3.5 μ, hyaline, smooth.

Habitat: Solitary or in groups of 2–4 individuals, in sandy-clay soil on top of mesquite (*Prosopis juliflora*) sandhill dunes, under the trees and immediately adjacent to the tree trunks (in New Mexico); in mesquite-catclaw flats (*Prosopis-Acacia*) (in Arizona), and in mesquite-cactus (*Opuntia*) areas (in Texas); in arid or semi-arid regions.

DISTRIBUTION IN NORTH AMERICA

Arizona. Santa Cruz County, 7 miles north of Nogales on Nogales-Tucson Highway 89, elevation 3857 feet, *W. H. Long and Victor O. Sandberg*, November 11, 1933—*1 plant 7849.* Pima County, 8 miles from Tucson on road to Sabino Canyon, elevation 2400 feet, *W. H. Long and Victor O. Sandberg*, September 22, 1934—*4 plants 8016: W. H. Long*, September 29, 1934—*1 plant 8382.*

New Mexico. Dona Ana County, Jornado Experimental Range, elevation 4150 feet, *W. H. Long and David J. Stouffer*, September 8, 1941—*2 plants 9602.* Luna County, 10 miles west of Deming on Highway 70, elevation 4300 feet, *W. H. Long and*

[1] Figures 4 and 6 were copied from plate 8 of Alfred Möller's Brasilischen Pilzblumen and show the plants twice their natural size, all other figures show the plants natural size; figures 7, 8, and 10 are made from photographs of the Texas material, while the remaining figures are from New Mexico specimens.

David J. Stouffer, September 12, 1941—*7 plants 9641;* September 13, 1941—*21 plants 9656.*

Texas. Starr County, Falfurrias, elevation 300 feet, *Dr. O. F. Cook.* September 1909—*several plants.*

The above descriptions and data were made from the Arizona-New Mexico-Texas plants. The field notes and 6 different sets of photographic prints are in the files of the senior author, while negatives of these prints are filed with the Mycological Collections of the Bureau of Plant Industry at Beltsville, Maryland. All of the specimens listed in this paper are deposited in the Long Herbarium at Albuquerque, New Mexico.

ILLUSTRATIONS: Schimp. Bot. Mett. aus den Tropen 7: Brazilischen Pilzblumen, *pl. 5, f. 1–4; pl. 8, f. 27–34;* Ark. Bot. **8**: no. 11, *tab. 1, f. 1–2, tab. 2, f. 1–5;* An. Mus. Nac. Buenos Aires **6**: *tab. 4, f. 1 (a, a, o,), tab. 6, f. 1;* Myc. Writ. **2**: *pl. 121, f. 1–3;* Phal. *f. 21, 22;* E. & P. Nat. Pfl. **1**: 1**, *f. 143 A–C;* E. & P. Nat. Pfl. **A**: *f. 77 A, B, C.*

THE ARIZONA-NEW MEXICO AREAS

The mesquite-sandhill dunes near Deming, New Mexico, consist of mounds of varying areas with heights ranging from 3 to 5 feet. These dunes are wind made and are composed of a sand-clay soil. They are covered with scrubby mesquite brush, of which only a few trees reach a height of 15 feet. The region is arid and crops grown there require irrigation; however none of the irrigation water ever gets over the dunes.

The *Itajahya* plants grow on top of the dunes in the midst of the mesquite brush and are located at the base of the larger trees where they are protected from the sun and strong winds and can utilize the water that runs down the tree trunks during rains; even a small shower will furnish some water to the plants.

The mesquite-sandhill dunes on the Jornado are usually taller and are composed of deep sand with larger mesquite trees than the Deming dunes. The *Itajahya* plants also grow on top of these dunes at the base of the trees.

The mesquite-catclaw flats where the *Itajahya* grows in Arizona have scattered trees of *Prosopis juliflora* and *Acacia Greggii.* The soil is a heavy clay-sand with a limestone subsoil. Here again our plants are found at the base of the trees next to the trunks.

THE TEXAS MATERIAL

The Texas plants were collected by Dr. O. F. Cook near Falfurrias in September 1909 and were sent to the Mycological Collections of the Bureau of Plant Industry at Washington, D. C., but this material can not now be located. However Dr. Cook made a number of very fine photographs and field notes at the time the plants were collected. These have given us an excellent idea of the characters of this phalloid. The plants have the white calyptra (FIG. 10), the lamellate, overlapping trama plates bearing the gleba throughout the body of the pileus, and the stout, thick stems with its many chambered walls (FIG. 8).

They differ from the Arizona-New Mexico material in having a cylindrical pileus completely covered with the volva caps (FIG. 7, 10), the absence of any veil, pileii with flattened tops (FIG. 7, 10) and circumscissile volvas (FIG. 7, 10) which remain on the pileii after elongation and in having the pores of the stems open both outwardly and some inwardly; these constitute the main differences between the Texas material and our Arizona-New Mexico plants. We are convinced that the Texas phalloid is the same species as ours, somewhat modified by environment but the differences not sufficient to warrant the erection of a new species.

The Texas area where these plants were found is an arid region but with rich black soil, originally covered with open stands of mesquite and cactus. Much of this native vegetation had been cleared away and the land put in cultivation under irrigation shortly before the phalloid was found. The *Itajahya* plants were growing in an old cotton field where they had to push through 2–3 inches of very hard, sunbaked soil when they elongated. This explains their flattened tops, cylindrical pileii and circumscissile volvas.

India. Ahmad (**1940**) in his paper on the Higher Fungi of the Punjab Plains figures and describes a phalloid which he identified as *Itajahya galericulata*. In a later publication (1941), however, he states that this identification was incorrect and that his plant was *Dictyophora irpicina* (*Clautriavia merulina* (Berk.) Lloyd). We have been fortunate to obtain a specimen of this plant and agree with Ahmad that it is not *Itajahya galericulata* but is some species of *Clautriavia*.

GENERAL REMARKS

Itajahya in South America is a very variable plant according to Möller and Fries. The variations are mainly in the size and development of the border of the funnel of the receptaculum and in the size and character of the calyptra. The extremes are often so great that one could call them two different species if seen alone without connecting forms. Möller (l.c.) aptly states this characteristic in the following language, "In every part of the sporophore, as well as in the thickness of the stem, an unusual instability of form prevails in this fungus. For this reason it is particularly necessary to observe and compare as great a number of individuals as possible, if one is not to fall into the temptation of establishing a special species for each one." Fries also states that "the different aspects presented by this fungus due to differences in extent of development of the receptaculum, the presence or absence of the calyptra show that they can be considered in systematic work only when a wide range of material is observed." This instability of form is not very pronounced in our North American plants, consisting mainly in the varying sizes of the individuals and the shape of the pileus. The funnel of the receptaculum and the calyptra are fairly constant.

The Brazilian plants grow under very different conditions from our North American plants. Möller reports his first specimen as growing on a rather steep clay bank of a forest brook, near Blumenau in the Province of Santa Catherina in Southern Brazil. Other individuals were obtained at intervals in the same place for 2½ years, all from a spot scarcely one square kilometer in extent, among the roots of a dead fig tree where the soil was rich in decaying leaves. Later Möller also found the plant in other localities near Blumenau, one place had an elevation of 1312 feet above sea level. The phalloid was also found in Rio de Janeiro by Glaziou among dead bamboo roots.

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We are indebted to Mr. John A. Stevenson for loan of material and for furnishing the glossy prints used in making figures 7, 8, and 10; to Dr. Lee Bonar for translating the Fries paper; to Dr.

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ALBUQUERQUE, NEW MEXICO
AND
CORONA, NEW MEXICO

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FUNGI NOVI DENOMINATI—I.

John A. Stevenson

The following fungi received from sources as indicated appear to be heretofore undescribed, but worthy of a name. Type specimens are deposited in the Mycological Collections of the Bureau of Plant Industry, Plant Industry Station, Beltsville, Maryland. Portions of the type collections of the Muller species from Brazil are also deposited in the herbarium of the Department of Plant Pathology, Cornell University and in the private herbarium of A. S. Muller. Where the material was adequate portions of the type collection of other species here named have been deposited in other mycological herbaria as indicated.

Meliola (Irenina) **Buettneriae** sp. nov.

Colonies 2–3 mm. diameter, compact, circular, scattered, not coalescing, amphigenous, but for the most part epiphyllous, and at times caulicolous, producing definite brown spots on host tissue; *hyphae* compact, branching commonly opposite, and at acute angles, 8–9 μ diameter; *capitate hyphopodia* alternate or unilateral, numerous, often touching, sessile or short-stalked, 15–30 μ long, 12–15 μ diameter; *stalk cell* cylindrical 3–6 μ long, 6 μ diameter; *head cell* broadly ovate to somewhat lobed or irregular, 12–15 μ diameter; *mucronate hyphopodia* few, opposite, or unilateral, 8–9 μ diameter at base, tip long cylindrical, 3 μ diameter; *mycelial* and *perithecial setae* none; *perithecia* few at center of colonies, rough, globose, 150–200 μ diameter; *asci* 2-spored, evanescent; *spores* 4-septate, deep brown, smooth, constricted at septae, 42–45 $\times$ 14–15 μ.

Formula under the Beeli system, 3103. 4220.

On living leaves and twigs of *Buettneria ramosissima* Pohl. (Sterculiaceae), Uberlandia, Minas Gerais, Brazil, A. S. Muller, *1058* (Type), May 16, 1936.

Coloniis amphigenis, plerumque epiphyllis et caulicolis, circularibus; *hyphis* 8–9 μ crassis, ramis plerumque oppositis; *hyphopodiis capitatis* alternantibus vel unilateralibus, 15–30 μ longis; *hyphopodiis mucronatis*, oppositis vel unilateralibus, 8–9 μ diam.; *setis* nullis; *peritheciis* globosis, 150–200 μ diam.; *ascis* 2-sporis, evanidis; *sporidiis* 4-septatis, ad septa constrictis, obtusis, 42–45 $\times$ 14–15 μ.

There have been no previous reports of any species of *Meliola* or its segregates on the genus *Buettneria*. On the Sterculiaceae reported species of the *Meliolineae* are distinctly different from *M. Buettneriae*, and in fact no species of *Irenina*, if this segregate is to stand, has been heretofore described for the family.

Meliola Cinnamodendri sp. nov.

Colonies dense, epiphyllous, often very numerous, circular at first, 2–4 mm. diameter, but coalescing to form a more or less uniform "sooty mold-like" covering over the leaf blades, not producing spots or discoloration of host tissue; *hyphae* dark brown, straight, branching commonly opposite, approximately at right angles, 7–9 μ diameter; *capitate hyphopodia* alternate, very rarely opposite, set at right angles to the hyphae, 18–24 μ long; *stalk cell* 4–9 μ long, 6–7 μ diameter, cylindrical; *head cell* ovoid, straight or curved, 12–15 μ long, 10–12 μ diameter; *mucronate hyphopodia* opposite or unilateral, 15–21 μ long, 7–9 μ diameter at point of attachment, tip straight or angled; *mycelial setae* erect or slightly curved, very numerous, 7–10 μ diameter, 135–275 μ long, uniformly dark brown, with 1-many teeth up to 30 mm. long or with 2–3 branches, each in turn subdivided into 2-several teeth; *perithecia* scattered uniformly through the colonies, somewhat verrucose, globose to globose depressed, 150–200 μ diameter; *asci* evanescent; *spores* 4-septate, rarely 3, ends obtusely rounded, deep brown, straight, constricted at the septa, 48–54 × 19–21 μ.

Formula under the Beeli system 3131. 5331.

On living leaves of *Cinnamodendron axillare* Endl. ex Walp. (Canellaceae), Viçosa, Minas Gerais, Brazil, A. S. Muller, *622* (Type), June 30, 1933.

Coloniis epiphyllis, 2–4 mm. latis, atris, confluentibus et irregularibus; *hyphis* atris, 7–9 μ crassis; *hyphopodiis capitatis* alternantibus, 18–24 μ longis, 10–12 μ latis; *hyphopodiis mucronatis* oppositis vel unilateralibus, 15–21 μ longis; *setis* mycelialibus numerosis, 7–10 μ crassis, 135–275 μ longis, rectis vel curvatis, 1-multis dentis, 5–30 μ longis, vel 2–3 furcatis denticulatis; *peritheciis* atris, globosis, 150–200 μ diam.; *ascis* evanidis; *sporidiis* 4-septatis, obtusis, ad septa constrictis, 48–54 × 19–21 μ.

Only one other species of *Meliola* has been reported heretofore on any member of the Canellaceae, *M. Thouiniae* Earle on *Winterania canella* L. in Puerto Rico. This latter species differs from *M. Cinnamodendri* in having unbranched setae, both alternate

and opposite capitate hyphopodia and smaller perithecia and spores.

Asterina Davillae sp. nov.

Colonies amphigenous, irregular to nearly circular, 1–4 mm. diameter, sometimes coalescent to form irregular patches over much of infected leaf blade, non-spot forming; *hyphae* medium brown, branching opposite or alternate and often at right angles, 3–4.5 μ diameter; *hyphopodia* opposite or alternate, one celled, sessile, or occasionally short stalked, ovate or less often lobed to irregular, 5–9 × 5–6 μ; *thyriothecia*, with scanty basal membrane, 150–200 μ diameter; *asci* oval to nearly globular, 4-spored, paraphysate; *spores* deep brown, 1-septate, deeply constricted at septa, 15–17 × 7–8 μ, one cell slightly larger; *conidia* not noted.

On living leaves of *Davilla rugosa* Poir, (Dilleniaceae), Viçosa, Minas Gerais, Brazil, A. S. Muller *583* (Type), June 4, 1933. No previous records of *Asterina* on the genus *Davilla* have been found. Species on other genera of the Dilleniaceae differ in spore size, presence of conidia and in other morphological characters.

Maculae nullae; *coloniis* amphigenis, irregularibus vel suborbicularibus, dein plus minus confluentibus et effusis; hyphis fuscis, ramis oppositis vel alternantibus, 3–4.5 μ diam.; *hyphopodiis* oppositis vel alternantibus, continuis, sessilibus, lobatis vel irregularibus, 5–9 × 5–6 μ; *thyriotheciis* 150–200 μ diam.; *ascis* 4-sporis, paraphysatis; *sporidiis* fuscis, 1-septatis, constrictis, 15–17 × 7–8 μ; *conidiis* non visis.

Asterina Mulleri sp. nov.

Colonies epiphyllous, non-spot forming, irregular to more or less circular, development sparse, black, 3–5 mm. diameter; *hyphae* branching sparsely, deep brown, 3–4 μ diameter; *hyphopodia* alternate or unilateral, 2-celled, up to 12 μ long; *stalk cell* cylindrical 2–5 μ long, 3–3.5 μ wide; *head cell* subglobular or pyriform, 2–3 lobed to irregular, at times bent at right angles to stalk cell, 4–8 μ long; *thyriothecia* few, irregularly scattered, 100–180 μ diam., circular, basal membrane scanty; *asci* subglobular, evanescent; *spores* deep brown, two celled, deeply constricted at septa, both ends broadly rounded, 14–18 × 7–9 μ.

On living leaves of *Passiflora speciosa* Gardn. (Passifloraceae), Viçosa, Minas Gerais, Brazil, A. S. Muller *790* (Type), May 20, 1934. Differs from other species of the genus on the Passifloraceae in its stalked two-celled hyphopodia.

Maculis nullis; *coloniis* epiphyllis, plus minus orbicularibus, nigris, 3–5 mm. diam.; *hyphis* 3–4 μ diam; *hyphopodiis* alternantibus vel unilateralibus, 1-septatis, 8–12 μ longis, subglobosis vel lobatis; *thyriotheciis* paucis, orbicularibus, nigris, 100–180 μ diam.; *sporidiis* 1-septatis, ad septa constrictis, 14–18 × 7–9 μ.

Prillieuxina Cinchonae sp. nov.

Fungus colonies hypophyllous, circular, up to 1 cm. in diameter, often appearing in series along secondary veins and coalescing to form linear areas 2–6 cm. long, extending from margin to midrib, black; *hyphae* abundant, thin, tortuous, anastomosing, medium to light brown, 3–3.5 μ diameter, remotely septate; *hyphopodia* none; thyriothecia scattered, few to many, hemispheric-lenticular, 150–300 μ diameter, occasionally elongated, 100–350 μ, dehiscing by irregular lobes at maturity; *asci* subglobose to broadly ovate, 30–45 × 25–35 μ, 8-spored; *paraphyses* none; *spores* conglobate, medium brown, 2-celled, constricted at septa, 24–27 × 12–15 μ, upper cell somewhat wider and more rounded at top than the lower.

On living leaves of *Cinchona pubescens* Vahl (Rubiaceae), Otto Reinking, San Carlos de Buena Vista, near Zapote, Costa Rica, May 20, 1943. Type, Myc. Coll. *71382*. Portions of the type collection deposited in the Farlow, New York Botanical Garden and University of Michigan herbaria.

Hypophylla, plagulas 1 cm. latas formans; *mycelio* anastomosanti 3–3.5 μ crasso; hyphopodiis nullis; *thyriotheciis* hemisphaerico-lenticularibus, 150–300 μ diam.; *ascis* subglobosis usque ovatis, aparaphysatis, 30–45 × 25–35 μ, octosporis; *sporis* medio 1-septatis et constrictis, fulvis, 24–27 × 12–15 μ.

Dr. Otto A. Reinking found this fungus in abundance on a tree of *Cinchona pubescens* growing in the forest near commercial plantings of *Cinchona*. He notes that it was causing not only definite leaf spots but discoloration (reddening) of infected leaves which were falling prematurely. The fungus is of no little interest because of the relation of its host to important economic species and the possibility of its transfer to them.

No record has been found of any similar fungus on the genus *Cinchona*. Two species of *Prillieuxina*, *P. distinguenda* (Syd.) Ryan and *P. Burchelliae* (Doidge) Ryan, reported on other genera of the Rubiaceae, are clearly distinct by virtue of spores not over half the size of those of the *Cinchona* fungus.

Seynesia brosimicola sp. nov.

Producing definite, more or less circular spots, 2–3 mm. in diameter, light reddish brown in color (near Japan rose of Ridgway), often very numerous and uniformly distributed over entire leaf blade with corresponding discolored areas beneath; *free mycelium* none; *ascomata* circular to irregular, dull black, epiphyllous, relatively few in number (2–12) per spot, 140–160 μ in diameter when mature with varying numbers of smaller immature ones intermingled, at maturity splitting at the center into 3–7 lobes; *asci* ovate to nearly globular, few in number, mostly 8-spored, 42–48 × 28–32 μ; *spores* medium brown in color, 22–25 × 10–14 μ, 2-celled, strongly constricted at septa, often breaking apart at maturity, one cell slightly longer and wider than the other; *no paraphyses* noted; *conidia* not present.

On living leaves of *Brosimum discolor* Schott, (Urticaceae) Ana Florencia, State of Minas Gerais, Brazil, A. S. Muller *633* (Type), June 21, 1933. No previous records have been found of the occurrence of *Seynesia* on any member of the Urticaceae.

Maculis amphigenis, fuscis, circularibus, 2–3 mm. diam.; *mycelio* nullo; *peritheciis* epiphyllis, atris, circularibus vel irregularibus, 140–160 μ diam., stellatim dehiscentibus; *ascis* ovato-globosis, octosporis, 42–48 × 28–32 μ; *sporidiis* brunneis, valde constrictis, levibus, 22–25 × 10–14 μ; *conidiis* non visis.

Micropeltella Mulleri sp. nov.

Thyriothecia epiphyllous, without spots, numerous, evenly scattered over leaf blades, circular, slightly raised at the center, with circular ostioles, deep blue-green with white margins, which disappear with age, 500–800 μ diam.; *asci* broadly clavate, 75 × 30 μ, sessile, 8-spored, aparaphysate; *spores* 3–7-septate, hyaline, straight, deeply constricted at septa and separating at septa when mature, 30–50 × 4–7 μ; *end cell* 7 × 9 μ, obtusely rounded.

On living leaves of *Coffea arabica* L., (Rubiaceae) Viçosa, Minas Gerais, Brazil, A. S. Muller *219* (Type), Sept. 24, 1900.

Thyriotheciis epiphyllis, sine maculis, numerosis, circularibus, atro-coeruleis, 500–800 μ diam., cum ostiolis circularibus; *ascis* aparaphysatis, late clavatis, sessilibus, octosporis, 75 × 30 μ longis; *sporidiis* hyalinis, rectis, superne late rotundatis, valde constrictis, 3–7 septatis, 30–50 × 4–7 μ.

Micropeltis coffeicola P. Henn. from Guatemala, which would appear from its description to belong in *Micropeltella* as now constituted, differs in its smaller thyriothecia, asci and spores.

Mycosphaerella Castillae Stevenson & A. J. Watson, sp. nov.

Perithecia epiphyllous, black, numerous, innate to erumpent, ostiolate, aparaphysate, 90–150 μ long, 75–114 μ diameter; *asci* clavate to subclavate, 8-spored, 35–65 × 4–12 μ; *spores* clavate to cylindrical, hyaline, straight or slightly curved, biseriate to irregularly arranged, ends obtuse, uniseptate, hyaline, 16–23 × 3.5–6 μ.

On living leaves of *Castilla costaricana* Liebm. (Urticaceae), Speedway Estate, Cairo, Costa Rica, R. C. Lorenz *3071* (Type) (Rubber Investigations), Sept. 14, 1940.

Maculis angulosis, amphigenis, anguste atro-marginatis, intus sordidis, infra brunneis, 4–12 mm. diam.; *peritheciis* epiphyllis, nigris, primum immersis, demum plus minusve emergentibus, 75–114 μ diam.; *ascis* clavatis vel subclavatis, aparaphysatis, 35–65 × 4–12 μ; *sporidiis* clavatis vel cylindraceis, rectis vel parum curvulis, uniseptatis, hyalinis, 16–23 × 3.5–6 μ.

This fungus produces numerous striking white spots on the upper leaf surfaces with definite narrow deep brown borders, vein limited, irregular to angular, up to 12 mm. in diameter, reddish brown beneath. No previous records of the occurrence of a *Mycosphaerella* on *Castilla* have been found.

Erikssonia Protii E. K. Cash, sp. nov.

Leaf spots cream-buff to deep olive buff (Ridgway), subcircular or irregular, limited by veins, 2–15 mm. in diameter, evident on both surfaces; *stromata* hypophyllous, thickly and evenly distributed over the spots, black, rough, stellate, carbonaceous, brittle, uniloculate, 0.2–0.5 mm. in diameter, arising from beneath the epidermis, soon appearing superficial with the base only slightly sunken in the epidermis, readily breaking off and leaving a black circle at the point of attachment, laterally elongated into 4–6 horn-like projections which radiate from the center; *single locule* deeply immersed in the center of the stroma, subglobose, 150–200 μ in diameter, with inconspicuous, conical ostiole, wall not differentiated from the stroma; *asci* cylindrical, acute at the apex, long-pedicellate, 125–150 × 8–11 μ; *paraphysoids* short, hyaline, filamentous; *ascospores* uniseriate, hyaline, oblong-ellipsoid, granulose, often guttulate near the ends, 12–15 × 5–7 μ.

On living leaves of *Protium asperum* Standl. (Burseraceae), Fruit Dale Dam, Almirante, Panama, Aug. 28, 1940, R. C. Lorenz *3070* (Type). Host det. P. C. Standley. Portions of the type collection deposited in the Farlow, New York Botanical Garden and University of Michigan herbaria.

Stromata hypophylla in maculis alutaceis distributa, atra, carbonacea, uniloculata, 0.2–0.5 mm. diam., lateraliter in processibus corniformibus e centro radiantibus stellatim producta; *loculi* in quoque stromate singuli, immersi, subglobosi, 150–200 μ in diam.; *asci* cylindrici, apice angustati, longe pedicellati; *ascosporae* uniseriatae, hyalinae, oblongo-ellipsoideae, granulosae, 12–15 × 5–7 μ.

The genus *Erikssonia*, originally named by Penzig and Saccardo as a member of the Hysteriaceae, was later redescribed by Theissen and Sydow (Ann. Myc. **15**: 315, 1917) as belonging to the Sphaeriaceae. In a more recent discussion (Ann. Myc. **29**: 387–390, 1931), based on an examination of type material of *E. pulchella* Penz. & Sacc., type of the genus, Petrak placed the genus in the Bagnisiopsidaceae, considering it to be a uniloculate *Bagnisiopsis*, characterized by radiating lateral projections of the stroma. The structure of the fungus on *Protium* is very similar to that described by Petrak for *Erikssonia* and it is therefore referred to that genus, although specimens were not available for comparison. It appears to be specifically distinct from the two known species: *E. pulchella* Penz. & Sacc., described on the leaf of an unknown plant from Java, and *E. Spatholobi* Theissen & Sydow on *Spatholobus apoensis* Elmer, collected in the Philippine Islands. Only hyaline spores have been found in *E. Protii*, but it is possible that they may become brown when fully mature, since those in the type species are said to remain hyaline for some time.

Patellea Hesperozygiae E. K. Cash, sp. nov.

Apothecia hypophyllous, superficial and easily detached from the host, scattered in a thin, dark subiculum, sessile, fleshy to horny, flat-disciform, 100–250 μ in diameter, plane or slightly convex when moist, the upturned margin conspicuous when dry, exterior furfuraceous, fuscous-black, hymenium concolorous; *asci* broad-clavate to pyriform, short-pedicellate, apex broadly rounded with wall much thickened, 8-spored, 22–30 × 10–13 μ; *spores* irregularly 2–3-seriate, clavate, 1-septate, slightly constricted, the upper cell broader than the lower, 9–10 × 2.5–3 μ; *paraphyses* exceeding the asci, filiform, thickened and branched at the apex, conglutinated in a brown mazaedium; *hypothecium* pale brown, plectenchymatous; *cortex* black, dense, roughened, particularly at the margin, by clumps of short, thick, black cells; *hyphae* of the subiculum fine, 1–1.5 μ diameter, thin-walled, pale grayish-brown, branched and interwoven.

On leaves of *Hesperozygia nitida* (Benth.) Epling (Labiatae), Araponga, Viçosa, Brazil, Nov. 1, 1934, A. S. Muller *856* (Type).

Apothecia hypophylla in subiculo hypharum tenuium pallide griseobrunnearum dispersa, patelliformia margine recurvato, fusco-nigra, furfuracea, 100–250 μ diam.; *asci* clavato-pyriformes, octospori, 22–30 × 10–13 μ; *ascosporae* 2–3-seriatae, clavatae, 1-septatae, leniter constrictae, cellula superiore crassiore, 9–10 × 2.5–3 μ; *paraphyses* filiformes, apice incrassatae et ramosae, in mazaedium brunneum conglutinatae.

This species is similar in dimensions of apothecia, asci and spores to *Patellea cyanea* (Ellis & Mart.) Sacc., described on leaves of *Quercus* from Florida (Jour. Myc. **1**: 97, 1885). The apothecia and subiculum of the latter, however, are steel blue or indigo blue, not brown, and the apothecia are less rough in the specimen examined (Ellis, N. Am. Fungi *1781*). *P. Loranthaceae* P. Henn. on leaves of Loranthaceae in Brazil differs in larger dimensions, according to the description.

Phleospora Prosopidis sp. nov.

Spots none; *pycnidia* amphigenous, but usually more abundant on the exposed surfaces of each leaf, petiolicolous, and on tips of twigs, numerous, scattered, immersed, dark, 175–275 μ diameter, 200–225 μ deep, opening by a wide pore (100–125 μ); *conidia* linear, obtusely rounded at one end, more acute at the other, straight or curved, hyaline, not constricted at septa, distinctly median one-septate, more rarely non- or 2–3-septate, 30–45 × 3–4 μ, extruding in pale pink translucent masses, surrounded by the dark margins of the pycnidia.

On living leaflets, petioles and young twig tips of *Prosopis pubescens* Benth. (*Strombocarpa pubescens* [Benth.] A. Gray) Shoshone, Amargosa Valley, California, Frederick V. Coville and M. French Gilman *455* (Type), April 26, 1932.

Maculis nullis; *pycnidiis* amphigenis, petiolicolis et ramicolis, innatis, numerosis, 175–275 μ diam.; *conidiis* linearibus, rectis vel curvulis, non constrictis, hyalinis, 1-septatis, rare 2–3-septatis, 30–45 × 3–4 μ.

This fungus is placed in this somewhat doubtful genus for want of a better place to pigeon-hole it. Taking the genus in the sense of Grove (British Stem and Leaf Fungi **1**: 431–436, 1935), however, it fits very well. No record of a similar fungus on any of the leguminosae has been found. *Phleospora Caraganae* Jacz.

produces definite spots on leaf blades and is characterized by smaller conidia.

Clasterosporium Polypodii sp. nov.

Hyphae scanty, prostrate, septate, sparingly branched, superficial on pinnae or twining about the trichomes, deep brown, 3–4 μ diameter; *conidia* scattered, erect, straight, deep brown, 8–20 septate, not constricted at septa, 6–8 μ diameter, 50–250 μ long, basal and apical cells narrowed.

On living pinnae and trichomes of *Polypodium nanum* Feé, (Polypodiaceae), Bolivar, Rio Paragua, Salto de Auraima, Venezuela, E. P. Killip *37346*a (Type), April 10, 1943.

Hyphis prostratis, septatis, fuligineis, parce ramosis, in pinnis superficialibus, vel trichomata circumtorquentibus, 3–4 μ diam.; conidiis rectis, fuligineis, 8–20 septatis, ad septa non constrictis, 6–8 μ diam., 50–250 μ longis.

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MOLDS IN RELATION TO ASTHMA AND VASOMOTOR RHINITIS

A REVIEW

Marie Betzner Morrow [1] and Edwin Palmer Lowe [2]

INTRODUCTION

Two concepts of asthma and vasomotor rhinitis are generally prevalent. Some claim that these diseases are the result of nasal pathology and should be treated as such: others, that allergy is the only basis to be considered. In a discussion of these Vaughan (**1939**) points out that the extrinsic case is typically allergic. The exciting cause is contact with some specific allergen to which the individual is sensitized, and with which he comes in contact through the skin, or the respiratory or digestive tracts, and from some source outside the body. This paper is confined to a discussion of those molds which are associated with inhalant respiratory allergy. The assumption of molds having etiological significance in asthma and vasomotor rhinitis seems to have arisen from the investigations of the relationship between these diseases and house dust and climate.

BEGINNINGS OF MOLD ALLERGY

In 1924 Van Leeuwen found that asthma was more prevalent in the humid regions of Holland, and attributed its cause to "miasmata" or "climate allergens," since he was unable to establish positive identity. A year later (**1925**) he reported the relief of patients' symptoms by the use of filtered air. He also found that changing a feather sensitive patient to kapok pillows failed to relieve her symptoms, and discovered that the new sensitivity was due to the molds developing on the kapok. Having found fungus allergy in as high as fifty per cent of Dutch asthmatics, the molds being principally *Mucor*, *Penicillium*, and *Aspergillus*, Van Leeu-

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wen concluded that saprophytic fungi were possibly the unknown "climate allergens."

Earlier, in America, Cook (**1922**) had called attention to house dust as a cause of bronchial asthma. He was never able to determine the exact identity of its active ingredient, although he did find that high temperatures would diminish its activity. Consequently, he concluded that house dust contained an unknown substance which had antigenic action. Leopold and Leopold (**1925**) working in Philadelphia found that filtered air in a dust-free room would relieve the asthmatic symptoms of dust sensitive patients. It is interesting to note that these results, independent and in the same year, tended to corroborate the findings of Van Leeuwen. Actually, the first report of inhalant fungus allergy in North America was that of Cadham (**1924**), who described three cases of asthma from wheat rust (*Puccinia graminis* Pers.).

In 1928 Cohen in this country found cotton and kapok-stuffed pillows, mattresses, and furniture to be sources of house dust antigen. A year later he reported asthmatic patients, specifically sensitive to molds isolated from these packings, clinically free from symptoms when the offending articles were removed. In Germany, Hansen (**1928**) found that fifteen per cent of his asthmatics reacted positively to skin tests with one or more of the *Aspergilli* and *Penicillia* cultivated from their environment, and in several cases he was able to reproduce symptoms by means of inhalation tests. Also in 1928 Jimines-Diaz and Sanchez Cuenca demonstrated that house dust sensitivity in Spain was often due to molds.

SURVEYS OF AIR-BORNE MOLDS

Blackley, as early as 1873, mentioned the presence of smut spores on pollen slides, and even reported severe reactions to the inhalation of *Chaetomium* and *Penicillium* spores in his own case. In 1923 Stakman and associates reported an abundance of mold spores in the air up to altitudes of 11,000 feet. Blackley mentioned his findings in connection with a study of possible pollen allergy, whereas Stakman was investigating the air distribution of plant pathogens. Neither of these workers, it seems, considered the possibility that the presence of mold spores in the air might be connected with inhalant allergy.

Since 1930 increasing attention has been given to inhalant mold allergy in the United States. First, it was necessary to determine what molds were air-borne, and what sensitivity was exhibited toward them. To determine the former, surveys were undertaken. Patterson and Gay (**1932**) reported *Alternaria* and *Hormodendrum* in Baltimore during the summer of 1930. In 1932 Balyeat and associates, working in Oklahoma, and using both slide and plate methods, isolated fifteen species, only two genera being represented, *Aspergillus* and *Penicillium*. They found few patients sensitive to molds, but their conclusion that molds were not very allergenic is open to question, since they sterilized their pellicles with heat prior to extraction. They attributed the lack of allergenicity to the small size of mold spores. In the same year Jimines-Diaz and workers (**1932**) observed mostly *Mucor*, *Penicillium*, and *Aspergillus*, *Alternaria* less frequently, on plates exposed throughout the maritime provinces of Spain. In 1934, Prince, Selle, and Morrow correlated high plate counts and increased symptoms in asthmatic patients with the winds blowing from the swampy regions north of Galveston, Texas, during the winter.

Airplanes were used in three surveys in 1935. Using this means to expose slides MacQuiddy (**1935**) found mold spores up to 7000 feet, whereas pollen was not recovered above 3000 feet. Meier and Lindberg (**1935**) reported spores of *Macrosporium*, *Cladosporium*, *Leptosphaeria*, *Mycospharella*, *Trichothecium*, *Heliosporium*, and *Uromyces* well north of the Arctic Circle. Using a special spore counter attached to the plane, Procter (**1935**) surveyed Boston and vicinity and found spores to 20,000 feet. *Aspergillus*, *Penicillium*, *Rhizopus*, *Mucor*, *Oospora*, *Monosporium*, *Macrosporium*, *Tilachlidum* and *Fusarium* were isolated. In 1936 Stevens not only collected spores of *Rhizopus*, *Aspergillus niger* van Tieghem, *Aspergillus fumigatus* Fresenius, *Penicillium cyclopium* Westl., and *Macrosporium* between 36 and 70,000 feet, but found that spores taken into the stratospheric environment would germinate when returned to their normal habitat.

From 1936 an increasing number of surveys were reported from many parts of the United States. Feinberg (**1936**, **1937**, **1942**) over a five-year period in Chicago collected spores by the plate

method and observed seasonal aspects in the case of *Alternaria* and *Hormodendrum*. Highest counts occurred there in the summer. Durham (**1937**) used the greased slide method to determine the prevalence of *Alternaria* in the United States and concluded that the *Alternaria* belt corresponded roughly to the wheat belt. Prince and Morrow (**1937**) observed high plate counts in the winter along the Texas Coast. *Aspergillus, Monilia, Penicillium, Helminthosporium, Cephalosporium*, and *Spondylocladium* were encountered most frequently. Later Durham (**1938**), again using the slide method, found the geographical distribution of *Hormodendrum* similar to that of *Alternaria*. In a survey of the Pacific Northwest Schonwald (**1938**) observed *Alternaria, Aspergillus, Hormodendrum, Trichoderma, Mucor*, and *Rhizopus*; and Pratt (**1938**) reported *Alternaria, Hormodendrum, Aspergillus, Penicillium*, and *Chaetomium* from Boston.

In 1939 studies of air-borne molds were made by the plate method in Havana, Cuba, by Cadrecha and Quintera, and by the slide method by Coles in Iowa, and Wittich in Minnesota. Wittich emphasized the seasonal aspects of smuts. Loose smuts occurred in June and July, stinking smuts in August and September, and corn smuts in the fall. Craige (**1940**) also reported high spore production and aerial dissemination of cereal rusts. Although Bigg and Sheldon (**1939**) found mold spores continuously at Ann Arbor, Michigan, seasonal peaks of *Alternaria* and *Hormodendrum* occurred in the spring and fall. Whereas Stroh (**1940**) concluded from his study of Seattle and vicinity that the mold incidence there was low, the average counts on his plates were comparatively high and included *Hormodendrum, Alternaria, Aspergillus, Cephalosporium, Cladosporium, Monilia, Mucor, Penicillium, Trichoderma*, and *Rhizopus*. Dimond and Thompson (**1941**) reported *Alternaria, Hormodendrum, Dematium* (*Pullularia*) de Bary & Low, *Aspergillus, Penicillium*, yeast-like forms, *Sepedonium* and others at New Haven, Connecticut, seasonal variation being observed for the first two. Waldbott (**1941**) exposed plates daily for a year at Detroit and observed a large number of forms. *Alternaria* and *Monilia* showed definite seasonal increase during summer and fall. Durham extended his earlier studies to Alaska in 1941, and found that rusts made up two

thirds of the total mold counts, but the total counts were considerably lower than those in the United States. *Hormodendrum, Alternaria, Penicillium, Phoma, Mucor, Fusarium, Monilia,* and *Aspergillus* were observed by Cohen (**1942**) at Buffalo, New York, throughout 1940. Seasonal variation was noted for most of these.

Working since 1938, Morrow, Lowe, and Prince have found molds widely distributed throughout Central and Southwestern United States, and although a large number of species have been encountered, certain ones tend to occur as dominants. Total counts have been found to be more uniform throughout the year in the South. The results would seem to indicate a seasonal rather than a regional trend in the case of certain dominants, as *Alternaria, Hormodendrum,* and *Fusarium;* neither seasonal nor regional trends being apparent in others, as *Aspergillus* and *Penicillium;* furthermore, a particular species, as *Pullularia pullulans* Berkh., not recognized as a dominant, may occur as a "shower" and make up a significant fraction of the total count.

EVIDENCE FOR MOLD ALLERGY

What is the accumulated evidence that molds behave antigenically?

Cadham (**1924**) established wheat rust (*Puccinia graminis* Pers.) as the causative agent of asthma; Van Leeuwen found fungus allergy in fifty per cent of his asthmatic patients; and fifteen per cent of Hansen's patients in Germany were sensitive to molds cultivated from their environments. Diaz's group in Spain (**1932**) concluded that true cases of climatic asthma were usually coastal, due to the abundance of fungi in the air, and secured successful results with mold therapy. Ellis (**1933**) correlated the high incidence of asthma in Port Sudan with the profuse occurrence of mold spores during the damp weather. Patients were found sensitive, and specific mold desensitization resulted in improvement.

Prince, Selle, and Morrow (**1934**) found a high percentage of patients sensitive to molds in the group tested in Texas, and the success secured with mold therapy indicated that fungi had a definite role in the disease. Feinberg (**1936**) concluded that seasonal hay fever due to molds was a definite clinical entity, since a

selected group of patients, whose seasonal symptoms corresponded to the maximum period of mold occurrence, was found sensitive and obtained relief when treated with mold extracts. Twenty patients whose histories suggested mold allergy were found sensitive by means of skin tests by Brown (**1936**) in Washington, D. C., and satisfactory results from desensitization with proper extracts were secured. He concluded that fungi were definite allergens and must be considered along with other active substances, as pollen, in the causation of respiratory allergic conditions. In Los Angeles, Lamson and Rogers (**1936**) found 12% of 1259 patients positive to skin tests.

From 1936, cases involving specific sensitivity to a single species were reported more frequently. The case of a druggist whose violent asthmatic attacks were induced by taka-diastase was reported by Leopold (**1936**). The clinical observations were substantiated by strongly positive skin reactions to *Aspergillus Oryzae* Cohn. Bernton and Thom (**1937**) reported four cases of respiratory allergy giving positive skin reactions to a saprophytic *Cladosporium*, and symptoms were relieved in three cases by specific desensitization. A case of asthma due to grain smut was reported by Wittich and Stakman (**1937**). The patient gave marked skin reactions to grain smut found in his sputum, and subsequent desensitization with smut extracts brought relief. Rackemann and associates (**1938**) in Boston found a high degree of specificity in the sensitivity of four patients to the plant pathogen, *Cladosporium fulvum* Cooke.

Ninety cases sensitive to molds and to pollens were reported by Feinberg in 1937. Treatment with molds was instituted in sixty cases with satisfactory results in most instances. Prince and Morrow (**1937**) found 36 of 46 patients mold sensitive, and in twenty of twenty-one cases satisfactory results were secured with mold therapy. Vander Veer (**1937**) found sixteen per cent of eighty patients in New York City sensitive. Twelve cases of respiratory mold allergy sensitive to three molds and yeasts were reported from Ohio by Harris (**1938**). Mold therapy produced good results in seventy-five per cent of the cases. In Boston, Pratt (**1938**) found that the most positive skin tests and the best results in mold treatment were secured with *Alternaria*.

In the Pacific Northwest, Schonwald (**1938**) found that 145 of 150 cases, with histories suggesting mold allergy, reacted positively to mold tests, and that seventy-seven per cent of 86 cases responded to mold treatment. Prince (**1939**) found molds acting as minor allergens in a study of 150 cases emphasizing non-pollen factors, particularly in the summer and fall. Mold sensitivity due to the four molds most commonly encountered on the exposure plates was reported from Cuba by Cadrecha and Quintera (**1939**). Thirty-six per cent of sixty patients skin tested by Rackemann (**1939**) in Boston reacted positively. Halpin (**1939**) found twenty-eight per cent of seventy-one seasonal hay fever patients in Iowa sensitive, principally to two genera, *Alternaria* and *Hormodendrum*.

Harris (**1939**) found that sensitivity to grain dust containing smut and other mold spores was apparently due to the grain smut rather than the molds, and in a further study that all the grain smuts did not have a common antigenic factor. Of 105 cases of respiratory allergy sensitive to smuts and mold fungi twenty-three per cent was reported by Wittich in Minnesota (**1939**), of which eight cases were primary smut allergics. Later (**1940**) Wittich reported that grain dust sensitivity was due principally to the biologic components of the dust, and that dust extracts would hyposensitize 85 per cent of the cases sensitive to the various dust allergens. Although Cohen and workers (**1939**) presented evidence that the active principle of house dust was contained in linters rather than any of the other contaminants, Hampton and Stull (**1940**) are of the opinion that house dust contains an antigen different from any of the ordinary inhalant components of house dust including linters or molds.

Johnson grass smut was found to be a complicating factor, rather than the primary cause of allergy in Arizona by Phillips (**1940**) and five or more seasons of exposure were necessary for the development of symptoms. Chobot and his associates (**1940**) found a definite percentage of 240 cases of inhalant allergy in New York City sensitive to molds, and subsequent tests indicated that this sensitivity was specific. In clinical testing, Stroh (**1940**) reported only a few cases reacting to molds in the Seattle region. Hansel (**1940**) found many ragweed patients sensitive to molds in

St. Louis, and obtained more satisfactory results when mold therapy was added to the pollen treatment. It was Schonwald's (**1941**) observation that, although in some instances mold sensitivity was the primary cause of respiratory allergy, it appeared more often as a complicating factor.

Realizing that skin tests have not always proved reliable, Harris (**1941**) attempted to evaluate clinical sensitivity to molds by experimentally reproducing respiratory allergy in twenty-two patients reacting to *Alternaria*. By means of provocative and inhalation tests, he concluded that a typical mold history in the presence of a positive scratch test indicated mold allergy, and the nasal test outside of the mold season was a safe and reliable means of evaluating *Alternaria* sensitivity. Pennington (**1941**) studied 526 cases of allergy in Tennessee, and concluded that mold sensitivity was not uncommon, and must be taken into account in any complete study of the allergic state. Waldbott and associates (**1941**) tested 841 patients and found sixty-nine per cent to react to one or more molds. From their study they concluded that mold sensitivity occurred mostly as a complicating factor in multiple sensitive patients. Sixty-five out of a hundred patients reacted positively to a powdery mildew on oak in California, according to Alderson and Mason (**1941**).

This is the evidence. What is its significance?

Certain workers have been reluctant to recognize the concept that molds may, and, in many cases, do act as allergens. However, Vaughan (**1939**), of whom Durham (**1942**) speaks as having written the 'first comprehensive textbook treatment of fungus spores as allergens,' says:

"At the present time it appears safe to say that all of the requirements have been met. Positive skin reactions have been observed which can also be produced by passive transfer, indicating the presence of reagin. Relief has been obtained by avoidance, or by hyposensitization, and symptoms have been produced following subsequent exposure. The existence of the various molds in sufficient quantity has been demonstrated. The postulates of Cooke and Thomen appear to have been fulfilled."

THE POSTULATES OF COOKE (Vaughan, **1939**)

1. Sensitization must be demonstrated by one of the following:
   a. A positive local reaction, cutaneous or ophthalmic.
   b. The original allergic manifestation must be artificially reproduced at will on introduction of the substance, either inhaled, ingested or subcutaneously injected.
2. It must be shown that the individual has come into contact in some way with the suspected substance in order to permit it to act as an etiologic factor.

(The postulates are broadly acceptable, although it should be borne in mind that 1-a often cannot be demonstrated. This is especially true in drug allergy, often also in food allergy. Sometimes inhalant allergens fail to give reactions either on the skin or conjunctiva, but do when introduced directly on the mucous membrane of the nose.)

THOMEN'S FIVE POSTULATES (Vaughan, **1939**)

These postulates must be fulfilled before a pollen (mold) * can cause epidemic or endemic respiratory allergy.

1. The pollen (mold) * must contain an excitant of hay fever.
2. The pollen (mold) * must be anemophilous.
3. It must be produced in sufficiently large quantities.
4. It must be sufficiently buoyant to be carried considerable distances.
5. The plant (mold) * producing the pollen (spores) * must be widely and abundantly distributed.

(These postulates apply to epidemic or endemic hay fever, obviously not sporadic hay fever, as in gardners, florists, etc. As with most postulates there are exceptions, but the exceptions usually deal with the individual rather than large groups.)

MOLDS AS ALLERGENIC EXCITANTS

What are the molds, then, that have been established as inhalant allergenic excitants?

Mucor, *Penicillium*, and *Aspergillus* were incriminated by Van Leeuwen (**1925**), *Puccinia graminis* Pers. by Cadham (**1924**), and *Penicillium glaucum* Link and certain *Aspergillus* species by

* Extended to include molds.

Hansen (**1928**). Others were gradually added. An undesignated species of *Alternaria* was reported by Hopkins as early as 1930. Others have been reported by a great many workers (Pratt, **1938**; Halpin, **1939**; Harris, **1941**). Many of these probably are *Alternaria tenuis* Nees, as this species is widely distributed in the United States. *Alternaria humicola* Oudem and *Alternaria Mali* Roberts were mentioned specifically by Brown in 1936 and the closely related species, *Phoma conidiogena* Schnegg by Benham in 1931.

A large number of Aspergilli have been reported: *A. candidus* Link, *A. clavatus* Desm., *A. conicus* Blochw., and *A. flavipes* Thom and Church (Brown, **1936**); *A. flavus* Link (Van Leeuwen, **1925**); *A. fumigatus* Fres. (Van Leeuwen, **1925**; Bernton, **1930**; Lamson, **1936**; Brown, **1936**); *A. glaucus* Link-group and *A. hortai* (Brown, **1936**); *A. Oryzae* Cohn (Brown, **1936**; Leopold, **1936**); *A. nidulans* Eidam and *A. niger* Tieghem (Van Leeuwen, **1925**; Brown, **1936**; Lamson, **1936**); *A. parasiticus* Speare and *A. terreus* Thom (Brown, **1936**); and *A. Sydowi* Thom and Church (Prince, **1934**). Among the Penicillia: undesignated *Penicillium* species (Van Leeuwen, **1925**; Brown, **1936**; Lamson, **1936**); *P. chlorophaeum* Biourge, *P. chrysogenum* Thom, *P. cyclopium* Westl., *P. elongatum* Dierckx, *P. expansum* Thom, *P. italicum* Wehmer, *P. lanosum* Westl., *P. roqueforti* Thom, and *Citromyces* species (Brown, **1936**). Among the Mucorales: *Mucor* species (Van Leeuwen, **1925**; Cadrecha and Quintera, **1939**); *M. plumbeus* Bon. (Flood, **1931**; Lamson, **1936**); *M. Mucedo* Bref. (Brown, **1936**); and *Rhizopus* species (Conant et al, **1936**); and *Absidia* (Waldbott et al, **1941**).

Monilias and yeasts include *Monilia* species (Lamson, **1936**); *M. albicans* Zopf. (Bernard, **1934**); *M. sitophila* Sacc. (Brown, **1936**; Prince, **1937**); yeast species (Taub, **1932**; Harris, **1938**); bakers' and brewers' yeast, *Saccharomyces cereviseae* Hansen (Brown, **1936**); and *Torula* (Waldbott et al, **1941**).

Plant pathogens cited include maple bark fungus, *Coniosporium sorticola* (Towey et al, **1932**); grain smuts (Brown, **1936**; Harris, **1939**; Wittich, **1939** & **1940**); *Puccinia graminis* Pers. (Cadham, **1924**; Wittich, **1940**); and *Microsphaera Alni* Wint. (Alderson & Mason, **1941**). A saprophytic *Cladosporium* (Bernton & Thom,

1937) and a tomato pathogen, *Cladosporium fulvum*, Cooke (Cobe, **1932**), have also been reported. Animal pathogens include *Trichophyton* species (Wise & Sulzberger, **1930**), *T. gypseum* Bodin and *Epidermophyton inguinale* Sab. (Brown, **1936**).

Other fungi reported include *Chaetomium* (Feinberg, **1936**; Lamson, **1936**); *Cephalothecium roseum* Cda. and *Dicoccum asperum* Lindau (Brown, **1936**); *Trichoderma* (Prince, **1937**; Schonwald, **1941**); *Helminthosporium* (Feinberg, **1936**; Prince, **1937**); *Fusarium* (Feinberg, **1936**); and certain unnamed molds from mildewed awnings (Nichol, **1931**).

SOURCES OF THE ALLERGENIC MOLDS

By far the greater number of air-borne molds come from the out-of-doors. Soil is perhaps the source of the greatest number. While the common forms (as *Penicillium*, *Aspergillus*, *Fusarium*, *Alternaria*, *Helminthosporium*, *Hormodendrum*, and *Mucorales*) are widely distributed, many of them flourish more or less locally and may be therefore sufficiently increased in a given environment, to cause definite sensitization. For example, since mildew of textiles is due generally to *Aspergillus* or *Penicillium* introduced in raw material during the process of manufacture, or acquired during exposure to the air in damp environments, awnings, tents, draperies, window-shades, and even wallpaper and the canvas beneath it are exceptionally potent sources of mold growth in damp districts (Galloway & Burgess, **1937**). Upholstered furniture, expecially that containing kapok (Conant, **1936**), and mattresses furnish excellent substrates for mold growth. Raw cotton is very often contaminated. It seems hardly a stretch of the imagination that the cheaper grades of cotton generally used in bedding or upholstery may contain much infested material from the raw product.

Wool may be a source of mold fungi, mostly *Penicillium* and *Aspergillus* (Burgess, **1934**). *Monilia sitophila* Sacc. is often found in bakeries and in many homes, and is quite potent as an allergen (Bernton & Thom, **1937**). Luggage, shoes or gloves, leatherbottom chairs, and other leather articles frequently become moldy (McLaughlin, **1932**). Natural silk is not immune from mold contamination; it seems to be more susceptible after

the finishing process than before it is degummed (Yendo, **1928**). Almost all food-stuffs are liable to fungus attack. Fresh fruits and vegetables are all subject to deterioration by molds. Foods in cold storage, either wrapped or unwrapped, are particularly likely sources of mold contaminants, and are a potential source of excitant to allergic individuals employed in markets, packing plants, etc.

Another important source of molds is plants, since many are infected with certain parasitic species of fungi. This source is often overlooked, for a large number of the fungous diseases are obligate parasites and cannot exist without their hosts. Rusts and smuts are probably the best-known plant pathogens to allergists, the smuts apparently being more antigenic than the rusts. Grain smuts in particular have been shown to be an important cause of asthma and hay fever in the wheat and corn belts (Wittich, **1939**, **1940**). It seems quite probable that many other plant pathogens may also have etiological significance in inhalant respiratory allergy, and investigations on sources of antigenic molds should be extended to include these.

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NOTES AND BRIEF ARTICLES

Melanopsichium on Polygonum aviculare

A species of *Melanopsichium* occurred very abundantly on this host in the Brooklyn Botanic Garden in July 1939. Attention was attracted to the smut by the occurrence of numerous areas here and there in the experimental field on a humid morning, as though some heavy machine oil had been spilled. However, examination revealed the presence of many plants of knot grass with the gall-like enlargements caused by this fungus. Large, hard, irregular, dark colored, firmly agglutinated, conspicuous spore masses, were well developed at the crown of the plant and numerous smaller ones were scattered along the creeping stem. In the following seasons additional specimens were collected, but in no case were they so abundant as in the first year.

Until recently only one species of this genus, *Melanopsichium austro-americanum* (Speg.) Beck was recognized, and has been recorded on various species of *Polygonum*. The only record on *P. aviculare* is from California. Recently, Hirschhorn (Nota d. Museo de La Plata (Bot. 32.) **6**: 147–151. 1941) and Zundel (Mycologia **35**: 164–184. 1943) have recognized two species and several varieties of the genus. The smut collected in the Botanic Garden belongs in the new species *M. pennsylvanicum* Hirschh., along with other collections from the Middle West to the East on various species of *Polygonum*.

The smut is widely distributed in the Mississippi Valley and is very common on Long Island. The usual hosts are the large, coarse species of *Polygonum*, particularly *P. lapathifolium* L. *P. virginianum* L. is also given as a host for *Melanopsichium pennsylvanicum*. This, however, may be questioned. In our herbarium there are two specimens labeled from Missouri as occurring on it. Apparently they both belong to the same collection made by C. H. Demetrio on Sept. 9, 1891. The host in both cases is probably *P. lapathifolium;* certainly it is not *P. virginianum*. It may be noted that both specimens consist of *Ustilago*

utriculosa (Nees) Tul. in the ovaries of the individual flowers, as well as the larger, irregular masses of *M. pennsylvanicum.*—GEORGE M. REED.

THEKOPSORA HYDRANGEAE

In regard to the article on 'Morphology, Cytology, and Parasitism of Thekopsora Hydrangeae,' appearing in the *Journal of the Elisha Mitchell Scientific Society* **59**: 45–68, 1943, the author requests that the following correction be made. Due to a misinterpretation of a statement made by Dr. B. O. Dodge in his paper on 'Morphology and Host Relations of *Pucciniastrum americanum,*' *Journal of Agricultural Research* **24**: 885–906, 1923, the present writer indicated that Dodge had not observed the budding process and formation of spore stalks in the uredinia of *Thekopsora Hydrangeae.* However, upon further investigation of this paper, I have found that Dodge did believe that these processes occurred in older sori of the rust.

It should also be noted that Professor L. O. Overholts reported, in 1933, the occurrence of this rust on *Hydrangea radiata;* whereas, Arthur named only one species, *H. arborescens,* as the alternate host.—LINDSAY S. OLIVE.

THE GENUS LONGIA

A Latin diagnosis of *Longia* was omitted from the recent article in Mycologia **35**: 414, 1943. It is given here to fulfill the requirements of the International Code.

Longia gen. nov.

Fructificationes agaricoidea; pileo subgloboso, depresso-globoso vel crasso-convexo; superficie glabra vel scabrida; stipite superne in columellam crassam percurrentem procurrenti; gleba atra, lamelloidea, libera; velo annulum relinquente; sporis atris vel obscure brunneis, subglobosis vel ellipsoideis.—S. M. ZELLER.

ITHYPHALLUS MURRILLIANUS WEST

Since this species was published (Mycologia **33**: 48. 1941) quite a number of specimens have been collected about Gainesville, Fla., and critically examined in a fresh condition. The

spores vary from 3 μ to 6.5 μ in length and are 2–2.5 μ broad,—not sufficiently different from those of *I. rubicundus*, of which it appears to me to be only a pale form. It frequently happens that species which seem distinct when collections are few will be found to run together when our knowledge of them becomes more extensive. All the specimens of the above plant that have been brought to my attention have been determined by me as *I. rubicundus*. Mr. West's effort to do me honor is appreciated but I hardly think I deserve it.—W. A. MURRILL.

BOOKS ON FUNGI AND MOLDS

The Office of Alien Property Custodian has licensed, during the past several months, the reprinting of scientific and technical books, of enemy origin, which are not available in a quantity sufficient to meet the demands of the wartime operations of science and industry.

In this connection the Custodian has received several queries concerning the possibility of licensing the republication of significant and generally unavailable foreign works in the field of fungi and molds. Before a definite decision can be made, it is necessary for the Custodian to be informed about the extent of the need of such works and to receive suggestions of specific titles for consideration. This can be accomplished if suggestions of specific significant works in these fields are sent by individuals to the Office of Alien Property Custodian, Washington, D. C. These suggestions or any inquiries should be addressed to Howland H. Sargeant, Chief, Division of Patent Administration, Office of Alien Property Custodian, Washington, D. C.

CONSERVATION OF SCHOLARLY JOURNALS

The American Library Association created in 1941 the Committee on Aid to Libraries in War Areas, headed by John R. Russell, the Librarian of the University of Rochester. The Committee is faced with numerous serious problems and hopes that American scholars and scientists will be of considerable aid in the solution of one of these problems.

One of the most difficult tasks in library reconstruction after the first World War was that of completing foreign institutional sets of American scholarly, scientific, and technical periodicals. The attempt to avoid a duplication of that situation is now the concern of the Committee.

Many sets of journals will be broken by the financial inability of the institutions to renew subscriptions. As far as possible they will be completed from a stock of periodicals being purchased by the Committee. Many more will have been broken through mail difficulties and loss of shipments, while still other sets will have disappeared in the destruction of libraries. The size of the eventual demand is impossible to estimate, but requests received by the Committee already give evidence that it will be enormous.

With an imminent paper shortage attempts are being made to collect old periodicals for pulp. Fearing this possible reduction in the already limited supply of scholarly and scientific journals, the Committee hopes to enlist the cooperation of subscribers to this journal in preventing the sacrifice of this type of material to the pulp demand. It is scarcely necessary to mention the appreciation of foreign institutions and scholars for this activity.

Questions concerning the project or concerning the Committee's interest in particular periodicals should be directed to Dorothy J. Comins, Executive Assistant to the Committee on Aid to Libraries in War Areas, Library of Congress Annex, Study 251, Washington, 25, D. C.

FARLOWIA

Mycologists will welcome the appearance of a "new star in the firmament" in the form of a journal devoted to the publication of articles on all phases of cryptogamic botany, including mycology. There has long been felt a need for such a journal and it is quite fitting and proper that it should bear the name of our old friend the late W. G. Farlow, who during his life-time did so much to stimulate an interest in that previously neglected phase of botany, and has made it possible to establish the Farlow Herbarium, from which institution the publication emanates.

The first number appeared in January of the present year and it is intended that the first volume shall extend over a period of two years, after which it is hoped a volume may be published each

year. Nearly two-thirds of the first volume is devoted to the fungi, which is an index to the interest in this field of work. The format of the journal is excellent and, under the supervision of Dr. David H. Linder, has been carefully edited. For further information address the Farlow Herbarium, Harvard Univ., Cambridge, Mass. F. J. SEAVER.

MYCOLOGICAL SOCIETY OF AMERICA

FUNGI COLLECTED AT THE 1941 FORAY

The general report of the 1941 Summer Foray of the Mycological Society of America at Macdonald College, Quebec, August 25–28, was given in Mycologia **34**: 350–353, 1942. Herewith is presented the list of fungi collected—a total of 362 species and varieties. Following this list is appended another list of collections made by two of those who attended the Foray, at points in the Province of Quebec from Montreal to the County L'Islet, in the days immediately after the close of the Foray. This latter includes 109 species, 49 of them not collected at the Foray itself.

The letters in parentheses after the species and authorities indicate the sources from which the list was compiled, as follows:

G = J. Walton Groves, Central Experimental Farm, Ottawa, Ontario.
HR = Robert Hagelstein and Joseph H. Rispaud, New York Botanical Garden and Mineola, New York.
JC = H. S. Jackson and R. F. Cain, University of Toronto.
Ja = Henry A. C. Jackson, Montreal.
MN = Ruth MacRae and Mildred Nobles, Central Experimental Farm, Ottawa.
P = René Pomerleau, Laboratory of Forest Pathology, Quebec.
S = Walter H. Snell, Brown University, Providence, R. I.
Su = W. D. Sutton, London, Ontario.

MYXOMYCETES: *Arcyria cinerea* (Bull.) Pers. (HR); *A. denudata* (L.) Wettst. (HR); *A. nutans* (Bull.) Grev. (HR); *Badhamia Dearnessii* Hagelstein (HR); *B. panicea* (Fr.) Rost. (HR); *B. rubiginosa* (Chev.) Rost. (HR); *Craterium leucocephalum* (Pers.)

Ditm. (HR); *Diachea leucopodia* (Bull.) Rost. (HR); *Dictydium cancellatum* (Batsch) Macbr. (HR); *Diderma effusum* (Schw.) Morg. (HR); *D. spumarioides* Fr. (HR); *D. testaceum* (Schrad.) Pers. (HR); *Didymium melanospermum* (Pers.) Macbr. (HR); *D. squamulosum* (Alb. & Schw.) Fr. (HR); *D. xanthopus* (Ditm.) Fr. (HR); *Fuligo septica* (L.) Weber (Ja); *Hemitrichia clavata* (Pers.) Rost. (HR); *D. vesparium* (Batsch) Macbr. (HR); *Lamproderma violaceum* (Fr.) Rost. (HR); *Leocarpus fragilis* (Dicks.) Rost. (HR); *Lycogala epidendrum* (L.) Fr. var. *exiguum* (Morg.) List. (HR); *Oligonema flavidum* Pk. (HR); *O. nitens* (Lib.) Rost. (HR); *Perichaena corticalis* (Batsch) Rost. (HR); *Physarum flavicomum* Berk. (HR); *P. globuliferum* (Bull.) Pers. (HR); *P. nutans* Pers. (HR); *P. nutans* Pers. var. *leucophaeum* (HR); *P. oblatum* Macbr. (HR); *P. pulcherrimum* Berk. & Rav. (HR); *P. pusillum* (Berk. & Curt.) List. (HR); *P. viride* (Bull.) Pers. (HR); *Trichia contorta* (Ditm.) Rost. var. *inconspicua* (Rost.) List. (HR); *T. persimilis* Karst. (HR); *T. scabra* Rost. (HR).

PHYCOMYCETES: *Endogone pisiformis* Link (JC, S).

PYRENOMYCETES: *Cordyceps* (see *Ophiocordyceps*); *Diatrype stigma* (Hoff.) Fr. (P); *Dibotryon morbosum* (Schw.) Theiss. & Syd. (G); *Erysiphe Cichoracearum* DC. (P); *E. Polygoni* DC (Su); *Gnomonia ulmea* (Sacc.) Thüm. (P); *Hypomyces hyalinus* (Schw.) Tul. (JC); *H. Lactifluorum* (Schw.) Tul. (JC); *Hypoxylon pruinatum* (Klotsch) Cooke (P); *H. fuscum* Pers. ex Fr. (P); *Lophiotricha viridicoma* (Cooke & Peck) Kauff. (JC); *Microsphaera Alni* (Wal.) Salm. (P, Su); *Nectria Peziza* (Tode) Fr. (JC); *Ophiocordyceps clavulata* (Schw.) Petch (JC, P, Su); *Phyllactinia suffulta* (Reb.) Sacc. (Su); *Plowrightia* (see *Dibotryon*); *Scoleconectria balsamea* (Cooke & Peck) Seaver (JC); *Uncinula Salicis* (DC) Wint. (JC, P, Su); *Ustilina vulgaris* Tul. (P); *Xylaria castorea* Berk. (JC); *X. polymorpha* (Pers. ex Fr.) Grev. (G).

DISCOMYCETES: *Ascocalyx Abietis* Naumov. (G); *Cenangium Crataegi* Schw. (G); *Dasyscypha Agassizii* (Berk. & Curt.) Sacc. (G, JC, P); *Dermatea acerina* (Peck) Rehm. (G); *D. balsamea* (Peck) Seaver (G); *D. Cerasi* (Pers.) Fr. (G); *D. Fraxini* (Tul.) Rehm. (G); *D. Peckiana* (Rehm) Groves (G); *D. Prunastri* (Pers.) Fr. (G); *D. Viburni* Groves (G); *Godronia Urceolus* (Alb. & Schw.)

Karst. var. *confertus* Hone (G); *Godroniopsis Nemopanthis* Groves (G); *Helotium fructigenum* (Bull.) Karst. (G); *Karschia lignyota* (Fr.) Sacc. (JC); *Leotia lubrica* (Scop.) Pers. (JC, P); *L. stipitata* (Bosc) Schroet. (P); *Pezicula Rubi* (Lib.) Niessl. (G); *Tympanis fasciculata* Schw. (G); *T. Prunastri* Rehm (G).

OTHER ASCOMYCETES: *Hypoderma commune* (Fr.) Duby (JC); *Lophium mytilinum* (Pers.) Fr. (JC); *Phacidium taxicola* Dearness and House (P); *Propolis faginea* (Schrad.) Karst. (JC); *Rhytisma acerinum* (Pers.) Fr. (Su).

LOWER HETEROBASIDIOMYCETES: *Calocera cornea* (Batsch) Fr. (G, JC); *Dacrymyces minor* Peck (JC); *D. palmatus* (Schw.) Bres. (JC, Ja, MN); *D. punctiformis* Neuhoff (JC); *Exidia gelatinosa* Duby [= *E. recisa* or a form of it?] (P); *E. glandulosa* Bull. ex Fr. (MN); *E. nucleata* (Schw.) Burt [= *Naematelia nucleata* (Schw.) Fr.] (JC, P); *E. pinicola* (Peck) Coker [= *Tremella pinicola* Peck, = *E. umbrinella* Bres.?] (P); *E. recisa* Ditm. ex Fr. (MN); *Gloeotulasnella pinicola* (Bres.). Rogers (JC); *Heterochaetella dubia* Bourd. & Galz. (JC); *Naematelia* (see *Exidia*); *Protohydnum lividum* Bres. (JC); *Sebacina caesio-cinerea* (von Hoehn. & Litsch.) Rogers (JC); *S. cinerea* Bres. (JC, P); *S. deminuta* Bourd. (JC); *S. Eyrei* Wakef. (JC); *S. Galzinii* Bres. (JC); *S. helvelloides* (Schw.) Burt (JC); *S. incrustans* (Fr.) Tul. (JC); *S. sublilacina* Martin (JC); *Tremella pinicola* (see Exidia); *Tremellodon gelatinosum* (Scop.) Pers. (MN, S); *Tulasnella bifrons* Bourd. & Galz. (JC); *T. pruinosa* Bourd. & Galz. (JC); *T. violea* (Quél.) Bourd. & Galz. (JC).

UREDINALES: *Coleosporium Solidaginis* (Schw.) Thüm. (P); *Cronartium Comandrae* Peck (P); *C. ribicola* Fischer (P, S); *Milesia polypodophila* (Bell) Faull (P); *Melampsora Abietis-canadensis* (Farl.) C. A. Ludwig (JC); *M. Medusae* Thüm. (Su); *Pileolaria Toxicodendri* (Berk. & Rav.) Arth. (P); *Pucciniastrum americanum* (Farl.) Arth. (P); *Uredinopsis mirabilis* (Peck) Magn. (P); *U. Osmundae* Magn. (P).

THELEPHORACEAE: *Aleurodiscus acerinus* (Pers.) von Höhn. & Litsch. var. *alliaceus* (Quél.) Bourd. & Galz. (JC); *A. amorphus* (Pers.) Rabenh. (G, JC, P); *A. griseo-canus* (Bres.) von Höhn. &

Litsch. (JC); *A. roseus* (Pers.) von Höhn. & Litsch. (JC); *Asterostroma cervicolor* (Berk. & Curt.) Massee (P); *Botryobasidium isabellinum* (Fr.) Rogers (JC); *B. subcoronatum* (von Höhn. & Litsch.) Donk (JC); *B. vagum* (Berk. & Curt.) Rogers (JC, MN, P); *Ceratobasidium atratum* (Bres.) Rogers (JC); *Coniophora cerebella* Pers. (P); *C. Kalmiae* (Peck) Burt (JC); *C. puteana* (Schum). Karst. (JC); *C. suffocata* (Peck) Massee (P); *Corticium amylaceum* Bourd. & Galz. (JC); ?*C. Berkeleyi* Cooke (JC); *C. bombycinum* (Sommerf.) Bres. (S); ?*C. confine* Bourd. & Galz. (JC); *C. confluens* Fr. (JC, MN); *C. coronilla* von Höhn. (JC, MN); *C. fuscostratum* Burt (= *C. ochroleucum* Bres.) (JC); ?*C. Galzinii* Bourd. (JC); *C. hydnans* (Schw.) Burt. (P); *C. helvetica* (Pers.) von Höhn. & Litsch. (JC); *C. investiens* (see *Vararia* below); *C. lactescens* Berk. (JC); *C. microsporum* (Karst.) Bourd &. Galz. (JC); *C. porosum* Bourd. & Galz. (JC); ?*C. punctulatum* Cooke (JC); *C. Tsugae* Burt (JC); *C. tulasnelloideum* von Höhn. & Litsch. (JC); *C. vagum* (as *Botryobasidium vagum*); *Cytidia salicina* (Fr.) Burt (MN, P); *Exobasidium Vaccinii* Fuck. ex Wor. (P); *Gloeocystidium furfuraceum* Bres. (JC); *Hymenochaete agglutinans* Ellis (JC, MN); *H. corrugata* (Fr.) Lév. (P); *H. spreta* Peck (JC, MN); *H. tabacina* Sow. ex Lév. (Ja); *Hypochnus rubiginosus* Bres. (P); *Peniophora affinis* Burt (JC, MN); *P. argillacea* Bres. (JC); *P. aurantiaca* Bres. (JC, Ja, S); *P. byssoides* (Pers. ex Fr.) Bres. (JC); *P. candida* (Pers.) Lyman (JC); *P. carnosa* Burt (JC); *P. cinerea* (Pers.) Cooke (JC, Ja, P); *P. cremea* Bres. (JC); *P. filamentosa* (Berk. & Curt.) Burt (JC, MN); *P. glebulosa sensu* Bres. (JC, P); *P. guttulifera* (Karst.) Sacc. (JC); *P. hydnoides* Cooke & Mass. (JC); *P. juniperina* Bourd. & Galz. (JC); *P. longispora* (Pat.) von Höhn. (JC, P); *P. martiana* (Berk. & Curt.) Burt (JC); *P. medioburiensis* Burt (JC); *P. nuda* (Fr.) Bres. (P); *P. odontioides* Burt (P); *P. pallidula* Bres. (JC, MN, P); *P. piceina* Overh. (JC); *P. pubera* (Fr.) Sacc. (JC); *P. Sambuci* (Pers.) Burt (JC); *P. sanguinea* (Fr.) Bres. (JC); *P. setigera* (Fr.) von Höhn. & Litsch. (JC, MN, P); *P. sublaevis* (Bres.) von Höhn & Litsch. (JC); *P. subulata* Bourd. & Galz. (JC); *P. tenuis* (Pat.) Massee (JC, MN); *P. Thujae* Burt (JC); *P. tomentella* Bres. (JC); *Solenia anomala* (Pers.) Fuckel (JC, Ja, S); *S. fasciculata* Pers. (JC, P); *Stereum Chailettii* Pers. (JC); *S. hirsutum* Willd. ex Fr. (JC, Ja,

P); *S. ochraceoflavum* Schw. in Peck (P); *S. purpureum* Pers. (JC, Ja); *S. rameale* Schw. (JC); *S. roseo-carneum* (Schw.) Fr. (JC); *S. rufum* Fr. (JC, MN); *S. sericeum* (Schw.) Morg. (Ja, S); *Thelephora anthocephala* Bull. ex Fr. (Ja); *T. intybacea* (Pers.) Fr. (JC); *Tomentella atrorubra* (Peck) Bourd. & Galz. (JC); *Vararia investiens* (Schw.) Karst. [= *Corticium investiens* (Schw.) Bres.] (JC, P).

CLAVARIACEAE: *Clavaria apiculata* Fr. (P); *C. cineroides* Atk. (P); *C. ligula* Schaeff. (P); *C. mucida* Pers. (P); *Physalacria inflata* (Schw.) Peck (JC).

HYDNACEAE: *Calodon* (see *Hydnellum*); *Grandinia farinacea* (Fr.) Bourd. & Galz. (JC); *Hydnellum Earlianum* Banker (JC); *Hydnochaete olivaceum* (Schw.) Banker (JC); *Irpex cinnamomeus* Fr. (MN, P); *Odontia abieticola* Bourd. & Galz. (JC); *O. bicolor* (Fr.) Bres. (JC); *O. fusco-atra* (Fr.) Bres. (JC); *O. lactea* Karst. (JC); *O. sulphurella* Peck (JC); *O. uda* (Fr.) Bres. (JC); *Phlebia strigoso-zonata* Schw. (JC, MN); *Steccherinum ochraceum* (Pers. ex Fr.) S. F. Gray (S).

POLYPORACEAE: *Daedalea confragosa* Bolt. ex Fr. (Ja, MN); *D. quercina* L. ex Fr. (MN, S); *D. unicolor* Bull. ex Fr. (Ja, MN, P); *Favolus alveolaris* (DC. ex Fr.) Quél. (= *Favolus canadensis* Klotsch) (G, Ja, MN, P); *Fomes applanatus* Pers. ex Wallr. (G, Ja, P, S); *F. conchatus* Pers. ex Gill. (MN); *F. connatus* (Weinm.) Gill. (Ja, MN); *F. fomentarius* L. ex Gill. (Ja, MN); *F. ignarius* L. ex Gill. (MN, S); *F. Pini* (Thore ex Fr.) Lloyd (MN, P); *F. pinicola* Swend. ex Cooke (S); *F. scutellatus* (Schw.) Cooke (JC, S); *Ganoderma lucidum* (Leyss.) Karst. (Ja, P); *G. Tsugae* Murr. (G, MN); *Lenzites betulina* L. ex Fr. (G, JC, Ja, MN, P); *L. saepiaria* Wulf. ex Fr. (G, Ja, MN, P); *Merulius bellus* Berk. & Curt. (JC); *M. fugax* Fr. (MN); *M. tremellosus* Schrad. ex Fr. (JC, P); *Polyporus abietinus* Dicks. ex Fr. (G, Ja, MN, P, S); *P. adustus* Willd. ex Fr. (P); *P. albellus* Peck (MN, P, S); *P. betulinus* Bull. ex Fr. (Ja, MN, P); *P. cinnabarinus* Jacq. ex Fr. (Ja); *P. circinatus* Fr. (Ja, P, S); *P. conchifer* Schw. (P); *P. distortus* Schw. ex Fr. (MN); *P. elegans* Bull. ex Fr. (Ja, MN, P); *P. glomeratus* Peck (S); *P. hirsutus* Wulf. ex Fr. (MN, S); *P. nidulans* Fr. (MN); *P. pargamenus* Fr. (G, Ja, P); *P. perennis* L.

ex Fr. (MN); *P. pubescens* Schum. ex Fr. (= *P. velutinus* Pers. ex Fr.) (MN); *P. Schweinitzii* Fr. (Ja, MN, P); *P. semisupinus* Berk. & Curt. (MN); *P. spumeus* (Sow.) Hornem. (JC, S); *P. tulipiferus* Schw. ex Overh. (Ja, MN, P); *P. versicolor* L. ex Fr. (Ja, P, S); *Poria candidissima* (Schw.) Cooke (MN); *P. ferruginosa* (Schrad.) Fr. (MN); *P. inermis* Ellis & Ev. (MN); *Porothelium fimbriatum* (Pers.) Fr. (JC); *Trametes mollis* Sommerf. ex Fr. (MN).

BOLETACEAE: *Boletinus merulioides* (Schw.) Murr. (Ja): *B. pictus* Peck (Ja, S); *B. spectabilis* Peck (G, Ja, S); *Boletus americanus* Peck (G, Ja, S); *B. elegans* Fr. (G, Ja, S); *B. leucophaeus* Fr. (G); *B. niveus* Fr. (G, Ja, S); *B. piperatus* Bull. ex Fr. (G, Ja, MN, P, S); *B. punctipes* Peck (G, Ja, S); *B. scaber* Bull. ex Fr. (G, Ja, P, S); *B. subtomentosus* L. ex Fr. (S); *B. viscidus* L. ex Fr. (G, S); *Phylloporus rhodoxanthus* (Schw.) Bres. (as *Paxillus rhodoxanthus* in Agaricaceae) (P).

AGARICACEAE: *Amanita flavoconia* Atk. (Ja); *A. muscaria* Fr. (G, Ja); *A. verna* Fr. (G, JC, P); *Amanitopsis vaginata* Fr. var. *fulva* Sacc. (G, Ja, P); *Armillaria adnatifolia* (Peck) Kauff. (G); *Cantharellus aurantiacus* Fr. (G, Ja); *C. floccosus* Schw. (S); *C. infundibuliformis* Fr. (Ja, S); *C. lutescens* Fr. (Ja, S); *C. umbonatus* Fr. (G, S); *Clitocybe cyathiformis* Fr. (G); *C. infundibuliformis* Fr. (Ja); *Collybia confluens* Fr. (Ja); *C. dryophila* Fr. (Ja, P); *C. hariolorum* Fr. (G); *C. maculata* Alb. & Schw. (G, S); *C. platyphylla* Fr. (G, P); *C. radicata* Fr. (G, JC, Ja); *C. stipitaria* Fr. (G); *C. strictipes* Fr. (G); *C. tuberosa* Fr. (G); *Coprinus micaceus* Fr. (G, Ja); *Cortinarius armillatus* Fr. (P); *C. raphanoides* Fr. (G); *C. violaceus* Fr. (Ja); *Crepidotus fulvotomentosus* Peck (Ja, P); *Entoloma salmoneum* Peck (Ja, S); *E. strictius* Peck (G, Ja); *Galera capillaripes* Peck (G, Ja); *G. tenera* Fr. (Ja); *Gomphidius maculatus* Fr. (G); *Hygrophorus ceraceus* Fr. (G); *H. conicus* Fr. (G, S); *H. coccineus* Fr. (S); *H. marginatus* Peck (P, S); *H. miniatus* Fr. (Ja); *H. nitidus* Berk. & Curt. (G, Ja); *H. puniceus* Fr. (G, JC); *Hypholoma sublateritium* Fr. (G, Ja, P); *Laccaria laccata* (Scop.) Berk. & Br. (G, Ja); *Lactarius deceptivus* Peck (G, Ja, S); *L. deliciosus* Fr. (G, Ja, S); *L. helvus* Fr. (G, Ja, P); *L. lignyotus* Fr. (Ja); *L. piperatus* Fr. (P); *L. subdulcis* Fr. (G, Ja, P, S); *L. vel-*

lereus Fr. (S); *Lentinus lepideus* Fr. (Ja); *Lepiota naucina* Fr. (G); *Leptonia asprella* Fr. (G); *L. serrulata* Fr. (Ja, S); *Marasmius androsaceus* Fr. (Ja); *M. cohaerens* (Fr.) Bres. (G); *M. epiphyllus* Fr. (P); *M. oreades* Fr. (G, Ja); *M. rotula* Fr. (Ja); *M. scorodonius* Fr. (G); *Mycena acicula* Fr. (G); *M. corticola* Fr. (G); *M. haematopa* Fr. (G); *Omphalia fibula* Fr. (G); *O. fibuloides* Peck (G); *Panaeolus papilionaceus* Fr. (Ja); *Panus stypticus* Bull. ex Fr. (G, Ja, MN, P, S); *P. torulosus* Fr. (P); *Paxillus involutus* Fr. (G, Ja); *P. rhodoxanthus* Schw. (as *Phylloporus rhodoxanthus* in Boletaceae) (P); *Pleurotus sapidus* Kalchbr. (Ja); *Pluteus cervinus* Fr. (G, Ja, P); *P. granularis* Peck (Ja); *Psalliota abruptibulba* Peck (G); *P. campestris* Fr. (Ja, P); *P. diminutiva* Peck (G); *Psathyrella disseminata* Fr. (Ja); *Psilocybe Foenisecii* Fr. (G); *Russula cyanoxantha* Fr. (G); *R. delica* Fr. (G, Ja); *R. densifolia* Secr. (G); *R. emetica* Fr. (Ja, S); *R. flava* Rom. (S); *R. foetens* Fr. (G); *R. fragilis* Fr. (S); *R. Mariae* Peck (Ja); *R. sericeo-nitens* Kauff. (G); *R. variata* Bann. (Ja, S); *Stropharia semiglobata* Fr. (G, JC, Ja, P); *Tricholoma rutilans* Fr. (G); *Trogia crispa* Fr. (G).

GASTEROMYCETES: *Cyathus stercoreus* (Schw.) DeToni (Ja); *Mutinus caninus* (Huds.) Fr. (G); *Scleroderma aurantium* (Vaill.) Pers. (G, JC, Ja, P).

FUNGI IMPERFECTI: *Darluca Filum* (Biv.) Cast. (Su); *Oidium ramosissimum* (Berk. & Curt.) Lind. (JC); *Tubercularia vulgaris* Tode ex Fr. (P).

POST-FORAY COLLECTIONS. The following were collected by Henry A. C. Jackson and Walter H. Snell in the Province of Quebec within a few days following the close of the Foray:

Brosseau, Co. Laprairie, August 29.

MYXOMYCETES: *Fuligo septica* (L.) Weber.

POLYPORACEAE: *Fomes scutellatus* Schw. ex Cooke; *Polyporus radiatus* Sow. ex Fr.

BOLETACEAE: *Boletinus merulioides* (Schw.) Murr. (near black ash); *Boletus parasiticus* Bull. ex Fr. (in quantity); *B. scaber* Bull. ex Fr.; *B. versipellis* Fr.

AGARICACEAE: *Amanita Mappa* Fr.; *Lentinus tigrinus* Fr.; *Paxillus involutus* Fr.; *Pholiota spectabilis* Fr.; *Russula variata* Bann.

GASTEROMYCETES: *Scleroderma aurantium* (Vaill.) Pers. (in hundreds).

Vaucluse, August 30.
PYRENOMYCETES: *Cordyceps militaris* L. ex Link.

LOWER HETEROBASIDIOMYCETES: *Dacrymyces palmatus* (Schw.) Bres.; *Tremellodon gelatinosum* (Scop.) Pers.

HYDNACEAE: *Dentinum repandum* (L. ex Fr.) S. F. Gray; *Steccherinum septentrionale* (Fr.) Banker.

POLYPORACEAE: *Poria obliqua* (Pers.) Bres.

BOLETACEAE: *Boletinus paluster* Peck (in quantity); *B. pictus* Peck; *B. spectabilis* Peck; *Boletus elegans* Fr.; *B. felleus* Bull. ex Fr.; *B. scaber* Bull. ex Fr.; *B. versipellis* Fr.; *B. viscidus* L. ex Fr.

AGARICACEAE: *Cantharellus infundibuliformis* Fr.; *C. lutescens* Fr.; *Collybia maculata* Alb. & Schw.; *Cortinarius armillatus* Fr.; *Lactarius deliciosus* Fr.; *L. lignyotus* Fr.; *L. sordidus* Peck; *Lepiota granosa* Morg.; *Psalliota campestris* Fr.; *Tricholoma rutilans* Fr.; *Trogia crispa* Fr.

GASTEROMYCETES: *Calvatia craniformis* (Schw.) Fr.; *Crucibulum vulgare* Tul.; *Lycoperdon gemmatum* Batsch; *L. pyriforme* Schaeff.

Near Elgin Road, Co. L'Islet, September 2 & 3.
PHYCOMYCETES: *Endogone pisiformis* Link.

PYRENOMYCETES: *Cordyceps militaris* L. ex Link; *Hypomyces Lactifluorum* (Schw.) Tul.

DISCOMYCETES: *Helotium citrinum* (Hedw.) Fr.; *Helvella elastica* (Scop.) Fr.; *Leotia lubrica* (Scop.) Pers.; *Scodellina leporina* (Batsch) S. F. Gray; *Spathularia clavata* (Schaeff.) Sacc.

LOWER HETEROBASIDIOMYCETES: *Auricularia Auricula-Judae* L.; *Dacrymyces palmatus* (Schw.) Bres.; *Guepinia helvelloides* DC. ex Fr. [= *Phlogistis helvelloides* (DC. ex Fr.) Martin].

THELEPHORACEAE: *Hymenochaete tabacina* Sow. ex Lév.

HYDNACEAE: *Calodon geogenium* (Fr.) Quél.; *Dentinum repandum* (L. ex Fr.) S. F. Gray; *Hydnum imbricatum* L. ex Fr.

POLYPORACEAE: *Fomes pinicola* Swend. ex Cooke; *F. scutellatus* Schw. ex Cooke; *Lenzites saepiaria* Wulf. ex Fr.; *Merulius niveus* Fr.; *Polyporus adustus* Willd. ex Fr.; *P. brumalis* Pers. ex Fr.; *P. cinnabarinus* Jacq. ex Fr.; *P. cinnamomeus* Jacq. ex Fr.; *P. circinatus* Fr.; *P. elegans* Bull. ex Fr.; *P. perennis* L. ex Fr.; *P. trabeus* Rostk.

BOLETACEAE: *Boletinus cavipes* (Opat.) Kalchbr.; *Boletus cyanescens* Bull. ex Fr.; *B. elegans* Fr.; *B. piperatus* Bull. ex Fr.; *B. versipellis* Fr.; *B. viscidus* L. ex Fr.

AGARICACEAE: *Armillaria imperialis* Fr.; *Cantharellus cibarius* Fr.; *Collybia dryophila* Fr.; *C. maculata* Alb. & Schw.; *C. tuberosa* Fr.; *Cortinarius armillatus* Fr.; *Entoloma strictius* Peck; *Hygrophorus ceraceus* Fr.; *H. miniatus* Fr.; *Laccaria laccata* (Scop. ex Fr.) Berk. & Br.; *Lactarius affinis* Peck; *L. deliciosus* Fr.; *L. helvus* Fr.; *L. scrobiculatus* Fr.; *L. torminosus* Fr.; *L. trivialis* Fr.; *Lentinus spretus* Peck; *Lepiota felina* Fr.; *L. granosa* Morg.; *Marasmius siccus* Schw.; *Mycena haematopa* Fr.; *M. pura* Fr.; *Panus stipticus* Fr.; *Paxillus involutus* Fr.; *Psalliota haemorrhodaria* Fr.; *P. micromegatha* Peck; ?*Russula atropurpurea* Peck; *R. flavida* Frost; *R. fragilis* Fr.; ?*Tricholoma imbricatum* Fr.; *Trogia crispa* Fr.

GASTEROMYCETES: *Lycoperdon gemmatum* Batsch; *L. marginatum* Vitt.; *L. pedicellatum* Peck.

WALTER H. SNELL

MYCOLOGICAL SOCIETY OF AMERICA

DIRECTORY—SUPPLEMENT—1943

New Members

Barghoorn, Dr. Elso S., Instructor in Biology, *Department of Biology, Amherst College, Amherst, Mass.*

Batista, Dr. Agusto Chaves, Professor of Plant Pathology, *Escola Agronomica da Bahia, Bahia, Brazil.*

Clark, Dr. Elizabeth S(tults), Assistant Plant Pathologist, *New Jersey Agricultural Experiment Station, New Brunswick, N. J.*

Coe, Donald M., Instructor, *Department of Plant Pathology, Washington State College, Pullman, Wash.*

Leach, Rupert, *3138 N.E. 32nd Ave., Portland, Ore.*

Lula, Julius, *1240 Bay St., Rosebank, Staten Island, N. Y.*

Nauss, Mrs. R. W., *31 Pondfield Road West, Bronxville, N. Y.*

*O'Neill, Frances Kelley, Research Assistant, *Department of Botany and Bacteriology, University of Texas, Austin, Tex.*

Shoup, Dr. C(harles) S(amuel), Associate Professor of Biology, *Box 77, Department of Biology, Vanderbilt University, Nashville, Tenn.*

Teter, Harold E., *Route 1, Box 66, Northville, Mich.*

Changes of Address

Blakeslee, Dr. A. F., *Smith College, Northampton, Mass.*

Bingham, R. T., *Mountain Lakes, N. J.*

Christenberry, Dr. George A., *Furman University, Greenville, S. C.*

Cooke, Wm. Bridge, *R. R. 2, Loveland, Ohio.*

Darker, Dr. Grant D., *Ben Venue Laboratories, Inc., Bedford, Ohio.*

Dennison, Mrs. R. A., *204 McLane Ave., Morgantown, W. Va.*

Doubles, Dr. James A., *1009 Courtland St., Greensboro, N. C.*

Gilbert, Dr. Frank A., *205 East North Broadway, Columbus, Ohio.*

Goodding, Dr. Leslie N., *U. S. Yuma Field Station, Bard, Calif.*

Grumbein, Mary Louise, see Dennison.

Hardison, John R., *Kentucky Agricultural Experiment Station, Lexington, Ky.*

Harrar, Dr. J. George, Director for Agriculture, *Rockefeller Foundation, Mexico City, D. F., Mexico.*

Johnson, Howard W., *Forage Crops and Diseases, Bureau of Plant Industry Station, Beltsville, Md.*

Kevorkian, Dr. Arthur G., *c/o American Legation, Managua, Nicaragua.*

Lohman, Dr. Marion L., *U. S. Sugar Plant Field Station, Box 213 C, R. R. 6, Meridian, Miss.*

Luttrell, Dr. Everett S., *Agricultural Experiment Station, Experiment, Ga.*

Nickerson, Dr. Walter J., *Department of Botany, Wheaton College, Norton, Mass.*

*Reese, E. T., *Knaust Bros. Mushroom Co. Laboratory, West Camp, N. Y.*

Rogers, Dr. Donald P., *Department of Biology, American International College, Springfield, Mass.*

Routien, John B., *Montezuma, Ind.*

Seliskar, Carl E., *17820 Nottingham Rd., Cleveland, Ohio.*

Springer, Miss Martha E., *Botany Department, University of Michigan, Ann Arbor, Mich.*

Stevenson, Dr. John A., *Mycology and Disease Survey, Bureau of Plant Industry Station, Beltsville, Md.*

Wellman, Dr. F. L., *10108 Pierce Drive, Silver Spring, Md.*

Whiffen, Miss Alma J., *Biological Laboratories, Harvard University, Cambridge, Mass.*

MEMBERS DECEASED

KELLEY, DR. HOWARD ATWOOD
THOMAS, DR. WILLIAM STURGIS

FINANCIAL STATEMENT

DECEMBER 31, 1941–DECEMBER 31, 1942

Balance on hand December 31, 1941		
Cash		$ 766.92
Government Bonds		200.00
Savings account		518.57
Receipts		
Annual dues in part 1942, 1943		1921.49
Interest on savings account		3.89
Expenditures		
New York Botanical Garden for Mycologia	1644.00	
Returned checks and discounts	13.36	
Postage, envelopes and post cards	46.29	
Secretarial help	18.75	
Mimeographing and printing	13.56	
Sect'y's travelling expenses to Dallas, Texas	87.00	
Lancaster Press for reprints of Yearbook	15.27	
Office supplies & shipping costs from Chapel Hill	8.98	
Retiring Sect. for expenses of closing office	4.33	
Refunds to members	3.00	
	$1854.54	
Balance on hand December 31, 1942		
Cash	756.33	
Government Bonds	200.00	
Savings account	600.00	
	$3410.87	$3410.87

(Signed) GEORGE B. CUMMINS, *Secretary-Treasurer*

Examined and found correct:

ALEXANDER H. SMITH, *Chairman of Audititing Committee,*
ANN ARBOR, MICH., Jan. 19, 1943

INDEX TO VOLUME XXXV[1]

INDEX TO AUTHORS AND TITLES

[1] This index was prepared by Gussie Mildred Miller.

INDEX TO GENERA AND SPECIES

New names and the final members of new combinations are in **bold face type.** Mistakes in the spelling of scientific names encountered in the text are corrected in the index.

MANUSCRIPT

Membership in the Mycological Society of America is prerequisite to publishing in MYCOLOGIA. The Board reserves the right to alter this regulation should circumstances warrant.

Papers should be submitted in duplicate to the Editor-in-Chief, or to any member of the Editorial Board. These papers will be run in the order of their approval, except that the address of the retiring President will be published when received; also papers which are paid for by the authors may be run at any time as excess pagination. These stipulations do not apply to Notes and Brief Articles, which may be used at the discretion of the Editor-in-Chief.

All illustrations will be treated as figures, and authors are requested to number these figures consecutively throughout the paper, using letters for the subdivisions as: Fig. 1, a; Fig. 2, c. Full page figures should be made to reduce to 4 × 6½ inches. No figure when reduced should exceed 4 inches in width. Each article is restricted to twenty pages, including illustrations. Ruled tabular matter is counted double. Should an author wish to publish more than twenty pages in one article, he may do so by paying for the excess pages at the rate of $3.50 per page. The total number of pages allowed an author for the year will depend upon the space available.

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To comply with the International Rules, it is recommended that contributors furnish *brief* Latin diagnoses of all new species and genera when their manuscript is submitted for publication. Authors are responsible for their own Latin.

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